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The National Almanac

Tracing the Evolution of Modern Almanacs from Ancient Ideas of Time and Suggesting Improvements

by

Moses B. Cotsworth of York.

5/- Net

180 Illustrations.

The Rational Almanac.

Without disturbing the accepted Gregorian lengths of Years now used, the advantages of the Proposed Permanent Almanac could be easily realised by 3 simple steps:—

1—From Christmas Day, 1916, cease naming Christmas Day by any week-day name, and merely call it "Christmas Day," which could be thus set apart as the extra yearly day, fitted into the last week of the year as a duplicate Sunday to permanently combine the week-end holiday with Christmas, and get rid of the troublesome and unbusinesslike changing of week-day names for dates throughout future years.

By naming "Leap Day" as a Public Holiday without any week-day name, justice would be done to salaried servants, whilst maintaining fixed day names for each date.

2—Let Easter, Whitsuntide and the other movable Festivals be FIXED (as Christmas is) to always fall on the fixed Dates to be arranged for 1916, or such other Permanent Dates as will best suit the convenience, welfare and pleasure of the People.—Easter, our longest "open-air" public holiday, would be better for the Church and people if celebrated in more ideal weather towards May.

3—Divide the 52 weeks of the Year *into* 13 *months of* 4 *weeks' each* for greater utility and business facility, by inserting a Mid-Summer month (Sol) as shown below.

PRESENT (1899) STYLE. *Varying every year to 1916.*

No. of Days in Qrs. and Half Years.	whom	Sun.	Mon.	Tues.	Wed.	Thu.	Fri.	Sat.
Days.								
90	JAN.	1 2 3 4 5 6 7						
		8 9 10 11 12 13 14						
		15 16 17 18 19 20 21						
		22 23 24 25 26 27 28						
		29 30 31						
	FEB.	... ... 1 2 3 4						
		5 6 7 8 9 10 11						
		12 13 14 15 16 17 18						
		19 20 21 22 23 24 25						
		26 27 28						
	MAR.	... ... 1 2 3 4						
		5 6 7 8 9 10 11						
		12 13 14 15 16 17 18						
		19 20 21 22 23 24 25						
		26 27 28 29 30 31 ...						
91		 1						
	APR.	2 3 4 5 6 7 8						
		9 10 11 12 13 14 15						
		16 17 18 19 20 21 22						
		23 24 25 26 27 28 29						
	MAY.	30						
		... 1 2 3 4 5 6						
		7 8 9 10 11 12 13						
		14 15 16 17 18 19 20						
		21 22 23 24 25 26 27						
	JUNE.	28 29 30 31						
		... ... 1 2 3						
		4 5 6 7 8 9 10						
		11 12 13 14 15 16 17						
181		18 19 20 21 22 23 24						
		25 26 27 28 29 30 ...						
		 1						
92	JULY.	2 3 4 5 6 7 8						
		9 10 11 12 13 14 15						
		16 17 18 19 20 21 22						
		23 24 25 26 27 28 29						
	AUG.	30 31						
		... ... 1 2 3 4 5						
		6 7 8 9 10 11 12						
		13 14 15 16 17 18 19						
		20 21 22 23 24 25 26						
	SEPT.	27 28 29 30 31						
		... ... 1 2						
		3 4 5 6 7 8 9						
		10 11 12 13 14 15 16						
		17 18 19 20 21 22 23						
		24 25 26 27 28 29 30						
92	OCT.	1 2 3 4 5 6 7						
		8 9 10 11 12 13 14						
		15 16 17 18 19 20 21						
		22 23 24 25 26 27 28						
		29 30 31						
	NOV.	... ... 1 2 3 4						
		5 6 7 8 9 10 11						
		12 13 14 15 16 17 18						
		19 20 21 22 23 24 25						
		26 27 28 29 30						
	DEC.	... ... 1 2						
		3 4 5 6 7 8 9						
		10 11 12 13 14 15 16						
		17 18 19 20 21 22 23						
184		24 25						
		... 26 27 28 29 30 31						

PROPOSED FUTURE STYLE. *Fixed from Christmas, 1916.*

Week No	Sun.	Mon.	Tues.	Wed.	Thu.	Fri.	Sat.	Days in the proposed Quarters of the Year	No. of Days in Month
1	1	2	3	4	5	6	7	1 JAN.	91
2	8	9	10	11	12	13	14		
3	15	16	17	18	19	20	21		
4	22	23	24	25	26	27	28		
5	1	2	3	4	5	6	7	2 FEB.	
6	8	9	10	11	12	13	14		
7	15	16	17	18	19	20	21		
8	22	23	24	25	26	27	28		
9	1	2	3	4	5	6	7	3 MAR.	
10	8	9	10	11	12	13	14		
11	15	16	17	18	19	20	21		
12	22	23	24	25	26	27	28		
13	1	2	3	4	5	6	7	4 APR.	91
14	8	9	10	11	12	13	14		
15	15	16	17	18	19	20	21		
16	22	23	24	25	26	27	28		
17	1	2	3	4	5	6	7	5 MAY.	
18	8	9	10	11	12	13	14		
19	15	16	17	18	19	20	21		
20	22	23	24	25	26	27	28		
21	1	2	3	4	5	6	7	6 JUN.	
22	8	9	10	11	12	13	14		
23	15	16	17	18	19	20	21		
24	22	23	24	25	26	27	28		
25	1	2	3	4	5	6	7	7 SOL.	182
26	8	9	10	11	12	13	14		
27	15	16	17	18	19	20	21	8 JUL.	91
28	22	23	24	25	26	27	28		
29	1	2	3	4	5	6	7	9 AUG.	
30	8	9	10	11	12	13	14		
31	15	16	17	18	19	20	21		
32	22	23	24	25	26	27	28		
33	1	2	3	4	5	6	7	10 SEP.	
34	8	9	10	11	12	13	14		
35	15	16	17	18	19	20	21		
36	22	23	24	25	26	27	28		
37	1	2	3	4	5	6	7	11 OCT.	92
38	8	9	10	11	12	13	14		
39	15	16	17	18	19	20	21		
40	22	23	24	25	26	27	28		
41	1	2	3	4	5	6	7	12 NOV.	
42	8	9	10	11	12	13	14		
43	15	16	17	18	19	20	21		
44	22	23	24	25	26	27	28		
45	1	2	3	4	5	6	7	13 DEC.	
46	8	9	10	11	12	13	14		
47	15	16	17	18	19	20	21		
48	22	23	24	25	26	27	28		
49	1	2	3	4	5	6	7		183
50	8	9	10	11	12	13	14		
51	15	16	17	18	19	20	21		
	22	×	..	..	.	..	..		
52	.	23	24	25	26	27	28		

365 Days in the Ordinary Civil Year. 365

DAVID DUNLAP
OBSERVATORY

The Two Styles Contrasted.

PRESENT STYLE. *Varying needlessly every year.*	PROPOSED FUTURE STYLE. *Fixed from Christmas, 1916.*
DISADVANTAGES.	**ADVANTAGES.**
Complicated and Changing.	*Simple, Fixed and Permanent.*
Calendar constructed on a shifting basis for Ecclesiastical purposes.	Fixed uniformly for the future. The Calendar should be constructed on the **natural unit of the week**, as the best for public convenience.
Days of the week on different dates during succeeding years.	Days uniformly fixed throughout future years.
Weeks not comparative year by year.	Weeks always the same each year, truly comparative and equitably measured to cover the year, as weekly diaries exactly fitting all the months.
Impracticable now to get the much-needed MONTHLY balances of income and expenditure for large businesses etc.	**Monthly business balances of income and expenditure made easy, thus conferring this most useful boon for business and public use.**
Months irregular, thereby involving broken weeks, which cause injustice in monthly payments and in face of weekly wages, etc., making monthly balances almost impracticable.	Months all alike, uniform in the length and days of their weeks. Equalities in monthly receipts payments, etc., secured. Monthly bills, drafts, etc., always fall clear of Sundays. Pay-days, etc., always on the same dates. Monthly accounts proportioned to expenses. Monthly appointments always on the same days of the week, whilst weekly and bi-weekly fixtures would recur on fixed dates throughout every month.
Business, Parliament, Law Courts, University, College, School, etc., Terms disturbed and unequal.	**All Terms fair and equal.**
Quarters, half-years, etc , uneven for interest, rents, etc., involving odd days of weeks, etc., to adjust, thus giving needless trouble and risk of error.	Quarters, half-year, etc., equalized —all ending in complete weeks, thus avoiding the troublesome adjustments and useless work. **Comparative returns and statements for all corresponding periods would be fair and true.**
Disturbance of quarter days, etc., when falling on Sunday.	All would fall on Saturday, their most convenient day, completing the week and quarter.
Unreliable comparisons of revenue expenditure, railway, and all business, etc., earnings owing to variations of Easter and the unequal lengths of months.	An absolutely equal and reliable basis of comparison assured without the trouble of adjustments week by week. The months would all be equal.
Periods of earning disagree with periods of payment, producing inequalities in earning-time.	Periods of earning and payment alike. Natural equalities of "earning-time" secured.
Wastes time, money and energy. Creates worry. Causes undue suffering to the poor. Tends to make mistakes in dates.	Saves time, money, energy and good temper. Avoids poor people needless suffering. Avoids mistakes in dates.
Easter, Whitsuntide, and other Festival holidays, etc., vary with the moon.	Festivals, holidays, etc , fixed upon uniform dates in future years. **Christmas and other Holidays in their happiest positions.**
Public holidays liable to fall on very inconvenient days and dates.	Public holidays sure to come upon the most convenient days and dates, to secure the week-end extension so highly prized.
Anniversaries, etc., on varying days.	Anniversaries, birthdays, etc , on the same day each year.
"Leap Year Day" badly fixed, and an injustice to salaried persons.	"Leap Day" suggested as a public holiday on a more suitable date. Provides fair play to salaried persons and servants.
The odd day of the year beyond 52 weeks causes confusion, etc.	Odd day of the year naturally absorbed in Christmas week
Impedes just Pension Schemes	Aids Sound Old Age Pensions.
Unequal and unsuited to present day needs.	Admirably suited to present requirements.
Irksome and anomalous. **No adequate reason exists for this erratic jumble of Months, Festivals, Dates, etc.**	Plain, yet systematic, tending to ease and brighten our daily life, and help forward the higher interests of mankind.
ADVANTAGE	**DISADVANTAGE**
Is now in force and satisfied the needs of our forefathers (who however through their simpler lives did not need the constant Almanac references now necessary in our hurried life, for everyday requirements).	Not yet in force, consequently the change would (if sanctioned) entail some slight inconvenience during its initiation.

It is submitted that the superior advantages of the proposed simple style altogether outweigh the insignificant advantages of the old confused style.

DEDICATED to the MEMORY
Of my esteemed Schoolmaster, the late

MR. EDWARD ROBINSON,

of the YORK BLUE COAT SCHOOL,

who so nobly and successfully devoted his great energies, fine abilities, and bright example for the good of his orphan charges,—all of whom revered and loved him as though he had been their self-denying father, and fervently admired him as one of Nature's truest noblemen.

To his training and kind help during the critical years of youth, after leaving school—without any reward, and when no obligation rested upon him but the high desire to raise the lowly—I, with others, owe grateful acknowledgment and thanks.

To his practical ideals and inspiration is attributable any desire I may have to help forward the cause of progress by such suggestions herein as may be deemed worthy of consideration and determined effort.

Many friends of true Education are now disappointed at the too prevalent tendency of parents to leave the burden of TRAINING *their children upon the schools, and the abnormal trend of the free-schooled youth of both sexes towards frittering away their best years over light, trivial, and trashy literature, during that precious time after leaving school when the brain is developing and most absorbent.*

May I urge upon parents the vast importance of that home help and training which has so conspicuously advanced the Scotch, German, and Swiss races, and ask Educational friends to take courage from the rising standard of our school staff, conscious that if all schoolmasters, mistresses, and teachers could be raised to the high standards of common-sense teaching and zealous interest displayed by the late Mr. Robinson amongst the poor, Mr. Frederick Andrews, of Ackworth, amongst the middle class, and the late Dr. Arnold (headmaster of Rugby) amongst the rich, much might be done to ennoble our race and improve mankind by patient effort, even in such unlooked-for directions as increasing the production of sheep, and thereby poor people's food (see page 154), whilst attempting to "Reform the Almanac."

M. B. COTSWORTH.

ACOMB, YORK.

DAVID DUNLAP
OBSERVATORY

The

Rational Almanac

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from Ancient Ideas of Time, and Suggesting Improvements,

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with Years, Half-years and Quarters equated.

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Model 28 Days' Month of 4 Weeks.

13 Months to the Year.

Holidays and Festivals,

also Week Days **Fixed** *on Permanent Dates to gain much more public convenience.*

180 Illustrations explaining the

Mystery of the Pyramids, Sphinx, Obelisks, Druidical Circles, Mounds, Vertical Stones, etc.,

Erected to Record Yearly Almanac Times.

PRICE, Christmas 1902 5/- NET.

DAVID DUNLAP
OBSERVATORY
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Rational Almanac

1993

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Model 28 Days' Month of 4 Weeks.

13 Months to the Year.

M. B. Cotsworth called to see me at Christmas time either in 1932 or 1933 at 201 Madison Ave., Toronto. He was interviewing various people in regard to the 13-month calendar.

He had a copy of this book with him & we were both interested in Egyptian matters.

May 20, 1941 C. A. Chant

This book from Thorp, March 1941

Mysteries of the Pyramids, Sphinx, Obelisks, Druidical Circles, Mounds, Vertical Scales, etc.,

Revealed in Record Yearly Almanac Times.

PRICE, $1- NET.

The original purpose of the Almanac was to ensure food supplies and enable the rulers to regulate their stores to last until harvest, whilst preventing famine from endangering public welfare. How very real and pressing were the early Egyptian needs for true knowledge of the exact Times and Seasons for Sowing, etc., may in some measure be judged by the following extracts from the Koptic Almanac. These indicate that the necessities of their rapidly increasing population compelled the Ancient Egyptians to erect the Pyramids to find the true length of the year as the first great step towards ensuring the fullest crops to feed their people.

SOME SEASONAL NOTES FROM THE MODERN "EGYPTIAN (KOPTIC) CALENDAR." *

* By R. L. N. Michell, B.A. (Oxon.) Published by Luzac & Co., London.

1st Koptic Month, TUT.

1900.

1 Sep. 11 Koptic (New Year), 1617
,, 13 Sow clover
,, 17 Jasmine planted
,, 18 Cotton gathered
,, 21 Olives gathered
2 ,, 22 The day and night equal
,, 23 Autumn begins. Limes abundant
,, 26 Highest rising of the Nile
,, 27 Opening of water channels
,, 29 Make syrups of lemons & other fruits. Almonds gathered
B ,, 30 Sow barley (Upper Egypt)
Oct. 1 Lettuce and celery come up
,, 3 The sap of trees recedes
,, 4 Great abundance of small fishes
,, 8 General ripening and storing of fruit. Gather Henna
,, 9 The leaves of trees begin to fall. Sow Winter vegetables
,, 10 Warm clothing should be worn

2nd Koptic Month, BABEH.

Oct. 12 Cut reeds for matting
,, 14 General cultivation of lands begins. Sesame harvest
,, 15 Rice harvest
,, 17 Coupling of cattle, sheep & goats
,, 18 Sowing of millet, flax & saffron
B 1 ,, 19 Sowing of barley and Bersim
,, 21 Ebony is cut
,, 23 Abundance of quails
,, 25 Beginning of mists and fogs. Dress more warmly
,, 27 Wood now cut remains sound
,, 29 Plant onions, garlic & asparagus
W Nov. 4 Cut Sudan beans
,, 6 Sowing of wheat (Lower Egypt). Sow lentils, lupins & chickpeas
,, 8 Good season for preserving fruit
,, 9 Begin to sow beans

3rd Koptic Month, HATUR.

Nov. 12 Sowing of poppies, cumin and corriander
,, 13 Flax and hemp come up
,, 14 Departure of birds of passage
,, 15 Pull up cotton plants
,, 16 Sugar-cane for sale
,, 19 Abundance of bananas
,, 21 Send sheep to pasture
D ,, 22 Harvest of durah
,, 23 Radish seed pressed for oil
W 1 ,, 25 Sow fennel. End of sowing lentils, chickpeas and lupins
,, 27 Sow fenugreek
Dec. 1 Ripening of chestnuts. Appearance of winter vegetables
,, 3 Horses sent to green pasture
,, 4 Balsam tree cut for oil
,, 6 Olives pressed for oil. Sowing of safflower

4th Koptic Month, KIYAHK.

Dec. 11 First cutting of clover
,, 13 Lambing season
,, 22 End of Autumn
P ,, 24 Manuring of fields. End of late rice harvest. Season for transplanting large trees
,, 25 Christmas of the Franks
,, 26 Ripening of citrons
,, 31 Foaling season of camels

1901.

P 1 Jan. 1 Pruning of vines.
,, 2 Abundance of sugar-cane cut for pressing
,, 3 Swarming of bees
,, 5 End of sowing poppies
,, 7 The ostrich lays eggs

5th Koptic Month, TUBEH.

Jan. 9 Gathering of oranges
,, 11 Tamarinds gathered
P 2 ,, 14 End of pruning vines
,, 19 Sow native tobacco
,, 21 Pull carrots and colocasia
,, 24 Irrigate winter crops and trees
P 3 ,, 25 Transplant date-palms and young trees
P 4 ,, 26 The sap of trees begins to ascend
,, 27 Good season for making dresses
,, 29 End of Sowing safflower. Gather seed of onion
Feb. 2 Foaling of high-bred camels
,, 5 Clover ripens. Goats in heat
P 5 ,, 6 Planting of Henna
,, 7 Plant walnut and peach

6th Koptic Month, AMSHIR.

Feb. 9 Sow early cotton
P 6 ,, 10 Planting of roses, jasmine and most flowering plants
,, 19 Plant vines and pomegranates
,, 25 Early beans gathered
,, 27 Sow native cotton
Mar. 2 Season of Mukti cucumbers
P 7 ,, 3 End of season for planting trees
P 8 ,, 5 Begin to plant sugar-cane
,, 9 Abundance of waterfowl

7th Koptic M'th, BARMAHAT

1901.

Mar. 10 Begin quail shooting
,, 12 Season for summer of silkworms. Mulberry in leaf
C ,, 13 Sow Indian cotton
D 1 Sow summer dureh
,, 15 Cattle to be taken from clover. Sow early sesame
,, 19 Gathering of flax and hemp
,, 20 Sowing of indigo
,, 22 Beginning of Spring
,, 24 Pull up flax
,, 30 Sow cumin
,, 31 Gather fennel seed
Apl. 1 Sow native cotton
,, 2 Begin wheat harvest
,, 3 The silkworm begins to spin
,, 6 Sow egg-plant and water-melon

8th Koptic M'th, BARMUDEH

Apl. 11 Pressing of balsam oil
,, 12 Sowing of rice
D 2 ,, 13 End of summer dureh sowing
,, 14 Season of chickpeas
P 9 ,, 15 End of planting sugar-cane
C 1 ,, 16 End of sowing Indian cotton
P 10 ,, 17 End of small planting
,, 19 Season of radishes
,, 21 End of quail shooting, Cairo
B 3 ,, 22 Beginning of barley harvest
,, 23 Coupling of camels
,, 30 End of large sowing
W 2 May 2 Wheat harvest (Lower Egypt)
,, 3 End of sowing rice and indigo. Plant Henna
C 2 ,, 5 End of sowing native cotton
,, 7 Thin clothing should be worn
,, 8 Mating season of ostriches. Begin to gather poppies

9th Koptic M'th, BASHANS.

May 9 Fertilization of the date-palm
W 3 ,, 12 End of late wheat harvest
,, 14 Gather balsam and apricots
,, 15 End of sowing Sudan beans
,, 17 Clear weeds from rice fields
,, 18 End of sowing sesame Safflower gathered
,, 19 Ripening of mulberries
,, 21 Plant colcasia. End of sowing indigo. ZEMZEM well filled
,, 27 Ripening of plums
,, 28 Abundance of apricots

10th Koptic Month, BAUNEH.

June 8 Miasma exhaled by Nile
,, 14 Abundance of water-melons
,, 15 End of sowing sesame
,, 16 Season for collecting honey
,, 17 Avoid drinking Nile 15 days
,, 24 Simum winds (70 days) begins
,, 27 Walnut fruit formed
,, 28 Figs and grapes ripen
July 1 End of gathering safflower
,, 2 Peaches and pears abundant
,, 4 Rise of Nile declared

11th Koptic Month, ABIB.

D 3 July 12 Sow Syrian dureh
,, 14 Season of grapes
,, 15 Abundance of cactus fruit
,, 17 Sow early onions
,, 19 Soaking of flax
D 4 ,, 20 End of sowing rice. Cut dureh
D 5 ,, 22 Sow celery, spinach, parsley, dureh and gargir
,, 25 Heliacal rising of Sirius
,, 28 Chicory sown
,, 29 Mustard seed gathered
,, 31 Grapes pressed for vinegar (wine). Gather fennel seed
Aug. 1 Ripening of dates in the Hedjaz
,, 2 Storing of water-melons
D 6 ,, 4 Sow autumn dureh
,, 5 Sowing of vegetables
,, 6 Opening of Upper Reservoirs

12th Koptic Month, MISREH.

Aug. 11 Abundance of water-melons
,, 12 Ripening of pistaccio
,, 13 Radish and native carrot sown
,, 14 Beginning of cotton harvest
,, 15 Plant narcissus bulbs
,, 20 Ripening of pomegranates
D 7 ,, 30 End of sowing autumn dureh
Sept. 1 Sowing of turnip and beetroot
,, 2 Gathering of acorns

EIYÂM EN-NÂSI. 1617.

Sept. 6 First of the Nasi
,, 7 SEPARATE EWES FROM RAMS
,, 8 Spawning of fishes
,, 10 Last of Nasi

Five inter-calary (Nasi) days added in ordinary years, but in Leap Years a sixth day is added, without the Gregorian adjustment in Centuries, hence the present Koptic Calendar (like the Russian) has drifted from the Equinox.—M.B.C.

As POPULATION INCREASED, the VERY EXISTENCE of the EGYPTIAN NATION was found to DEPEND upon applying EXACT ALMANAC KNOWLEDGE to increase CROPS for Food

NOTE.

The Introduction was printed with the earlier part of the Almanac Section in 1902, and the first part of the Pyramid Section before my visit to Egypt, etc., in 1900 led to those remarkable extensions which proved to be so highly desirable, although they deferred the issue of the book and considerably increased the cost.

I felt bound to investigate the subject further as there seemed a compensating value in the increasing Calendar interest which the collateral solutions of the "Early Bible Ages of Men," "Pyramid," etc., questions might give towards securing more earnest consideration by civilised nations. Several years have been occupied in experiments and investigations which, through other more pressing work, could not be completed earlier.

The main proposals were in print before March, 1899, and several friends with whom I had freely conversed on these ideas had proofs thereof—one part of which unfairly appeared unauthorised in a London weekly and Sunday paper at the end of March, 1899, showing misleading adaptations.

The preceding page has been transposed with the Combined Calendar, finally placed at the end for handier reference.

The insertion of the insets after pages 78 and 154 in the already printed sections was unavoidable, but it is submitted that they, together with the other extensions, have made the work more complete and effective.

For the convenience of readers willing to consider and advocate this Reform whilst travelling and visiting friends, the book has been kept to pocket size, which also best suits the illustrations and tables herein.

M. B. COTSWORTH.

INTRODUCTION.

The following pages embody my proposals towards Almanac Reform and the crude results of my investigations into Almanac Research, so far as limited time and opportunities have yet enabled me to trace. They represent but the first breaking of the ground which abler minds may bring to fuller fruition than my limited snatches of broken time beyond business hours have yet enabled me to do.

These outlines of this novel yet complex subject of the Evolution of men's ideas of the Year's length ought to have received entire attention under far more favourable conditions of access to records, quietude, and unlimited time, than my limited means could afford.

The only available oddments of time necessitated such frequent and lengthy breaks in the continuity of thought, that parts herein may appear disconnected or incomplete, whilst some repetition was unavoidable.

I could but struggle my best under these limitations which restricted me from more complete mastery of the subject which so far grew in interest, that it did not seem right to leave unpublished the results so far as now derived, particularly as they appeared so likely to stimulate interest in that useful Almanac Reform, which impressed me as most desirable the more I considered the extended practical and material benefits it would confer upon humanity, by adding to the productive and social conveniences of daily life, as all History proves true Almanac Reform has always done.

The more I considered the difficulty and complexity of those inevitable efforts of primitive men to find the year by observations of the Sun's apparent movements, the more convincing grew the idea that the very long term of the Year could not possibly have been found out or used to record the ages, etc., of the earliest men, but must have been deferred until much later generations had developed decided powers of record and computation.

After careful thought and mentally weighing all the evidence and probabilities made known to us in the earliest records, together with the glimpses of primitive men's knowledge displayed by the wild races of Africa, America, Australia, etc., I was irresistibly forced to the conclusion that it was absolutely beyond the powers of the earliest men to find out the length of the Year.

Even if they had rightly connected the Seasonal effects with their cause in the Sun's apparent movements, the almost insuperable difficulties (as explained later) absolutely precluded the possibility of their discovering the true Year's fractional length from nature, until many centuries of primitive research had evolved data upon which their slowly moulded ideas could determine the complex factors controlling the Year.

Probing the matter further, I came to the conclusion that the first men would not even suspect such a long term as the Year. That was far too long and complicated a period for their mental grasp. They inevitably had first to count by the moon, whose easily counted days and seeming control over the vital conditions of Human (female) Life, Tides, etc., would almost entirely absorb attention to the exclusion of the study of the Sun, beyond that most marked of all Nature's signs, the causation of day, night, and heat, which would first appear to indicate the prime functions of the Sun.—Yet the Sun's apparent movements were obviously the cause of the Seasons and therefore indicated the natural lines of Year finding or Almanac Research.

INTRODUCTION.

Men could not possibly have extended their "Year" (unit of Time for counting Ages, etc) at one bound from "Month" to the "Solar Year" of about 12½rd Moons for the very simple reasons—

(a) That they could not by any means have literally known the length of the Year period, and

(b) They lacking a system of figures, could not have mentally extended their longest unit of Time from "Month" to "Year."

In proof of this may be instanced the remarkable fact that even at this dawn of the 20th Century (or say in at least the 60th Century of man's known existence on earth) the ancient "¼-moon-period" which we call the "week" of 7 days, is still the practical unit of time as measured in our minds; whilst history proves that the great Roman race up to about 754 B.C. had only a "Year" of 304 days.—By about 509 B.C. their "Year" had grown to 12 moons, totalling 354 days, with bi-annual additions of 21 days, making 1,460 days in the 4 Years, averaging 365 days each.

I desire to draw particular attention to this peculiar 21 days' adjustment which, as the ¾-moon period, is neither more nor less than the old Druidical "quarter-moon" adjustment, by which the earliest men of necessity had to count their time. Being inherently habituated to that method from the earliest times, they naturally adopted it to adjust their "years,"—then nationally recorded by the leading Roman consuls at the time publicly driving the Annual Nail into the wall of the "Temple of Minerva," the goddess of Wisdom and Science.

Many more of these indisputable historical facts showing the growth of men's ideas of the year's length might have been adduced, but are precluded by the limits of this book; however, we may fairly conclude that it would at first be impossible for men to mentally grasp the long-year-unit, when they had no appreciable gauge to go by. That was totally different to measuring distances, etc., which they could see; besides which, the confirmed habit of "moon counting" would be so firmly rooted in the minds of the vast bulk of the community that extensions to longer units than the Moons for computing ages, etc., was only possible by very slow and easy stages.

The most probable "First Stage" beyond the Month would be a "5 months' period of 150 days," counting each of the 5 digits of the hand as a month of 30 days.

It is a most significant fact that the term "Month" never occurs in the Bible until, when directly after the Deluge, Noah began to sow seeds; but what is still more indicative is the indisputable fact, most plainly recorded in Genesis VII. and VIII., for those who will read it aright, that this exact period of 150 days is most strongly emphasized as the term of the Flood's rise and fall which would most vividly impress later men's minds, whilst we know that the Deluge (probably exaggerated to impress the new era) was the historical landmark of the Eastern Nations.

Further, the "Years" of life recorded for Abraham and Isaac when measured by this Almanac or "Year" of 150 days only equal 72 and 74 of our Years respectively. This brings their lives down to the credible and approximate limit of men's ordinary span of life as 70 years, which all history from the time of David, etc., confirms as a ripe old age. Full details of these stages, etc., are given in the "Early Bible Ages Section."

INTRODUCTION.

Here I would draw attention to the fact that the wandering Arabs, who do not practise Agriculture, still count by the Moon and allow their Mohammedan Calendar (as reprinted in the "Almanac Section") to be still governed by the Moon's motions. Thus their "Years" are not fixed like our truer Year, but are moveable irrespective of the Seasons. On the other hand the oldest Agricultural nations of China and Egypt, paid their greatest national attention to the Solar Year, to select right times for sowing to ensure their people's food supply.

Experience and experiments convinced me that it was impossible for the earliest men to have fixed their length of Year by the stars, as we have been commonly taught to believe, because it was utterly impracticable for them to pursue such investigations until they had first invented and continuously recorded a definite system of Time—That was incidentally proved to me by the fact that but for my knowing the Time was 8·0 p.m. on both occasions when I sighted the handle stars of "The Plough" when disced above the Holgate Windmill in December (as explained at the end of the Pyramid Section), and further, knowing that an interval of about two weeks had elapsed between the two sightings, I should never have been able to distinguish between the nightly cycle of the Fixed Stars and their extremely gradual reproduction of that identical circle as a Yearly track.

Undoubtedly, apart from tuition, I should certainly have begun any study of the stars by observing the bewildering series of motions shown by the most brilliant planets such as Venus, and like the earliest men viewing those stars on natural grounds should have failed to understand such motions and been lost in the maze, the brightest of which show such confusing movements.

But if the "Basis of Natural Time" had imperatively to be discovered and a simple system of sub-division of its parts framed as the first step, then obviously the most attractive means which could occur to primitive men, in hot countries, was the automatic shadows cast by the Sun from the sheltering trees, etc.

A brief study of shadows showed that a single pointed pole however high could not by its shadows indicate the Year's length, for the higher the pole the more surely did the Sun's outer rays of light meet behind it and swallow up the shadow-tip before it reached the ground. The Sun's fierce glare rendered direct sighting impossible until smoked glass or other protection was provided to protect the eyes of observers.—These difficulties were best surmounted by the pyramid method of research which had the further advantage of being adaptable in building to whatever Equinoxial slope might be applicable to the latitude of its site, and then that slope could be used as a slicer or "cut-off" plane to mark off by the apex record of the inter-noon lengths of shadows at the Equinoxial-days, the mid-way point of the Sun's apparent Yearly course.

There, however, investigators were perplexed by the almost inexplicable fact (which we know, but men then did not) that the Solar Year is 365·242 days long. Now as the Equinoxes occur at varying times during the 24 hours' day, whilst the most practical time for daily observation was at noon, it consequently follows that the Equinoxial Sun's noon slope was never exactly the same in two consecutive years, and the vital noon length of pyramid shadows was

thereby varied from year to year nearly a quarter of the inter-noon gradation as explained herein. Hence centuries of pyramid observations, necessitating a series of improving experiments in building pyramids to truer shapes, must have elapsed before that most vital point of knowledge was discovered.

It seems impossible to conceive that any close student of pyramid shadows could believe that the right pyramid shape could be designed until, after the experience of many repeated failures and amendments of slopes had taken shape in pyramid building. Further smaller model pyramids would almost certainly be used as patterns along with the larger ones during the erection of the latter.

These significant indications are notably present in the pyramids of Egypt, Mexico, etc., whilst their remarkable resemblance indicates, not that one race of people copied from the other, but rather that each on its own account sought by this, the simplest and best method suggested to men by natural signs, to solve the problems of Time and that greatest Time-unit—the Length of the Year—as an imperative pressing need of human social life, because as the early races gathered into communities for social convenience and defence, they were bound to regularly sow seeds and other crops at the right times to ensure food.

Then, the sad experience of failing crops, famine, pestilence, etc., would force the necessity for more exact knowledge of the Seasons upon the responsible chiefs. As the population increased, truer knowledge of the year's terms would increase in importance until the very existence of the people would appear to depend upon the application of true year-knowledge to the growth of agricultural foods.

That point of view renders intelligible the indomitable pyramid building efforts of the corn-growing early Egyptian Rulers, who had as their objective this greatly valued knowledge for the nation's good; whilst the stupendous height to which they carried their pyramids is easily explained by their enormously perplexing difficulty in settling the true length of the Year, which could only be differentiated by comparing the Equinoxial noon shadows, cast from the great heights to which their pyramids were so sacrificingly raised for this most adequate of objects men ever had in view—the permanent assurance of their individual and national life.

After the Year's length was found out by the study of the Great Pyramid's shadows, the Egyptian Rulers by counting days and forming a Calendar, could so arrange their agricultural sowings, etc., with such accuracy, that full and regular crops could be relied upon; —not only to supply all internal requirements, but also to enable their country to become the "granary" for surrounding nations, whose wealth could be thus attracted to Egypt when, as we know from the earliest records, neighbouring nations could know that "there was Corn in Egypt"—a phrase which has lived through about 40 centuries and still indicates the place of plenty.

Surely we cannot but admit that such a glorious result as the birth of the Calendar for the welfare of the Egyptian people and the furtherance of Civilization, was well worth all the vast efforts and stupendous labours expended in building even the

vast series of Egyptian Pyramids, to bring forth the knowledge of the true Year, which is the greatest permanent and most practically valuable factor ever made known to humanity.

Subsequently the basis of the Almanac became known to the Greeks through their merchantmen then trading with the exclusive Egyptians at Alexandria, as we now similarly trade with China and through the "Treaty Ports" learn the mysteries of that ancient conservative race.

From the Greeks it was passed to the Romans by whose conquests it became known over Europe.—In the declining days of the Roman Empire, pampered rulers so abused it to lengthen their terms of office "for greed of gain" that drastic reform under the guidance of an Alexandrian scholar became imperative during the great Julius Cæsar's time.

Further Almanac Reform was rendered necessary in the time of the illustrious Pope Gregory XIII., though absurd international and church jealousies have prevented that obviously wise change from being completed until the year 1900, when the Russian Government and the Greek Churches have at last elected to adopt the Gregorian style.

But all these appear as mere side issues, when compared with the results of the inestimable labours and researches of the Egyptians in developing the natural system of Time and discovering the true length of the Year, in the early dawn of civilization.

Then old standing usages were sacredly transmitted from parents to children, and held the strongest sway, whilst knowledge only "grew from more to more," by painfully slow and laborious stages, amidst difficulties which seem almost insurmountable when we fairly examine them, and realize the imperfect instruments, limited means of expression, and defective systems of record then available.

We can never estimate the unspeakable toil and exacting mental labours which the Egyptian pyramid builders endured to gain their Almanac, neither can we fully appreciate the resulting value which that knowledge has conferred upon subsequent generations of humanity, who have been blessed thereby beyond the value of all the gold the world contains; but I believe that it is our common duty to remember that great past of our race, and by realizing the great and widespread convenience obtainable from a more perfect Almanac, seek to perfect for the advantage of our people now and through posterity, that greatest work around which human minds have ever centred.

I quite admit that few people appreciate the very real advantages which would result from a Rational Reform of the Almanac. We have nearly all been taught to believe that the Almanac is practically perfect, and throughout our lives have so fully accepted the ideas of its perfection from our ancestors, that our minds are hardly free to form a rightly independent judgment of its imperfections.

But if we critically and impartially examine the sub-divisions of the year from the practical view of the general public convenience, which ought to be our first consideration in fixing the basis of any Calendar, we are forced to the conclusion that the prevailing old style Almanac ought to be simplified and perfected to suit the pressing and advancing conditions of our Time.—We should do our share willingly and thoroughly.

In the First (Almanac) Section the need of such reform is explained, and I have endeavoured to show how that improvement might conveniently be carried out to the public advantage.

Whilst considering those means, points of historic and general interest were brought out which it seemed desirable to print, as they called for further enquiry into the origin of the Almanac in "Prehistoric Times." There book-records failed me and I was forced to fall back upon my own resources in the investigation.

Remembering that grandfather used to measure my height each birthday by cutting its notch into the wooden pillar supporting the mantel-shelf at the family fire-side, that formed my first conception of the record of passing years. I looked back upon those as "my years" when growing and years seemed so long.

Further back I could just call to mind in childhood how my great-grandfather used to tease me in our little walks, by finding from the length of his shadow when it was tea-time on Sunday. As one of the old Agricultural Labourers who had even to build their own houses with sods (not being able to buy bricks), he had never been able to afford a watch, and therefore had to resort to thus indirectly reading Time by shadows from nature's indications, as was generally done in country districts until cheap watches came within the reach of the Labourers, some of whom in remote districts still use the "Sun-sighting" and "Shadow-pin" guides to Time.

Thus my peculiar early training and habits of thought favoured this enquiry, whilst local surroundings and especially the location of our home with the Holgate Windmill, as a North "sighting-staff" upon the hill-top, directly opposite, provided natural means of enquiry all ready on the spot. The before-mentioned accidental notice of the altered position of the Stars over the Windmill's "lightning-conductor" plainly indicated and suggested the ancient value of "sighting-staffs."

Beyond those indications I found within ready access, Ancient British "Vertical Stones," etc., at Aldborough, which upon inspection suggested a partial solution of their Year-finding purpose, as all evidence pointed to the study of shadows as the most obvious means of tracing the Year.

Further investigation into the possible ways most naturally suggestive to early men, in their imperative efforts to find out the length of the Year as the most urgent want of human knowledge when population was increasing, indicated most decisively that the Pyramid or Cone built to a great height, was the most feasible means by which early men could gain that knowledge; as tests of Sun-shadows from stakes and poles proved them to be far too short to attain practical results.

A protracted series of Sun-shadow experiments with Pyramids and Cones of various slopes, variously orientated upon carefully prepared Diagram Paper, upon which the shadows were carefully outlined at each half-hour of the Sunshine days during the last two Summers, proved, beyond the possibility of doubt, that the Pyramid was by far the best for the purpose, whilst, further, it pre-eminently possessed the four essentials—

1. Being most easily built to the requisite height;
2. Having its flat slope best adjusted to the most difficult Equinoxial noon Slope required;
3. Best adapted by its square shape to mark the orientation of the N., S, E. and W. points of the Compass.
4. Displayed by its peculiar "arris-ridges" the most truly marked and characteristic shadows distinguishing the different Seasons of the Year.

Ultimately cumulated evidence based purely upon these shadow experiments from Poles, Cones, and subsequent reasoning thereon, so strongly emphasized this as the great object for which the Pyramids were built, that I became fully convinced that such was the original purpose of the Pyramid-builders.—I tried, by testing the facts, to be cautious and not force that conclusion, which however, became more certain the more the various factors were searchingly examined.

Having finally arrived at that conclusion on purely natural grounds, I then resorted to Ancient Histories (chief of which were the Bible, Egyptian, Assyrian Indian, Chinese, Central American, and Peruvian Sacred records) to prove whether my conclusion would bear the search-light of Historical facts.

Finding that the great weight of their evidence so strongly supported the results at which I had previously arrived, and that such remarkable prominence was therein given to treasuring knowledge of the Year's length, I became absolutely convinced of the Year-finding Purpose of those Pyramids, Cones, Vertical Stones, etc., which still mark the old localities inhabited by Ancient Races throughout the World.

All subsequent evidence by which I have been able to test that conclusion tended to rivet it all the more firmly as the true one, the deeper the question was probed and the further pyramid data in different parts of the world were considered, until finally the beautiful simplicity and astonishing accuracy of the shortest pyramid-shadow-test at the Equinoxes, revealed the true year's length so vividly, when after counting the intervening days with the oddment measured upon the "4·45 ft. day-gauge" and recorded by "Shadow-rods." that all possibility of doubting that conclusion vanished.

Thus the Pyramid was proved to be the easiest best, and surest Almanac-finding method which natural indications suggested to Primeval men.

From that conclusion it was evident that in pre-pyramid times men could not have counted their ages by our 'years," because the year-unit was until then unknown to men.

That truth appeared to throw a new light upon the Early Bible Ages of men, Joseph and Moses in Egypt, etc. It evidently ranged far back beyond the commonly accepted idea that the earliest men went by the Stars in fixing their Seasons.

That college-trained idea seemed to be wrong, and some of the difficulties of Chronology appeared to be cleared up.

Local inspection of Silbury Hill, Stonehenge, etc., displayed a similar Druidical system as having been used by the Ancient Britons, as explained in the "Addenda."

It is not possible within this small book to more than briefly outline some of the impartial historical evidence in confirmation of these remarkable results, but I have endeavoured to show by direct photographs and other independent testimony, that these conclusions are based upon reliable data, strongly supported by facts, and not stretched to meet my case.

I have advisedly left out the conflicting opinions of Egyptologists and Babylonian, Assyrian, etc., Archæologists respecting the Ancient Gods (many of whom had several variant names) and the pre-historic mythical years.

Investigations on natural lines leave no possibility of doubt in my mind that "months" and "5 month years" would be counted in traditional history, long before the "Solar Year's true length" could have been known. The fabulous and exaggerating tendencies of the early civilizations over-lapping each other, are so well known, that it would seem useless and a sheer waste of time to attempt to readjust those inflated and conflicting records, which at their best are but matters of interest.

We can only safely regard them as successively based upon the various "years" in use as "Long-time-Units," ranging from the "month" and then gradually extended in stages as knowledge increased, until the approximate "Solar Year" was generally adopted by the Egyptian and Assyrian Observers as the result of their investigations of the Sun's movements when tested by Pyramid-Shadows.

Not until then could consistent records of time be kept, nor were methods of sub-division into Almanac dates possible.—Neither could a universal system of subdividing the hours of the day be arranged in very ancient times, when the people were but ignorant tribal groups cherishing local prejudices and warlike habits, which precluded free intercourse or mutual agreements.

Still the daily rotation of Sun-shadows (though later differently sub-divided by the Babylonians, Chinese, etc.) did develop local systems easily applied by pegging out fixed and equal geometric hour lines, which consequently measured longer hours near noon when the Sun-shadows were shortest, and therefore moved less rapidly along the north side, hence the then unequal hour lengths as the shadows passed the equal spaces.

But that means was impracticable at night, as even if the moon shone bright enough to cast shadows they occurred at different times each night, and so could not be used to rightly sub-divide the night,—and until the equal divisions of night-time were fixed upon, systematic study of the Stars was impracticable.

A further essential to the investigation of Star motions was that the points of the compass had to be determined through Pyramid experiments, as uncertain N. S. E. and W. points based upon the Sun's varying rising and setting points must long have impeded progress, when early men were groping for the bases of knowledge.

From these considerations it appears absolutely certain that methodical and reliable study of the stars only became possible after pyramid research had by degrees established a Basis of Time with its sub-divisions, as well as the principles of indicating the parts of the field of vision by compass points.

No doubt when once the utility of star observations became fully known, the Pyramid methods of research would rapidly become obsolete, as the establishment of Time and direction data rendered stellar study an incomparably easier guide to the Year.—Moreover it offered the immensely valuable desideratum that instead of the local pyramid the stars furnished that universal view open to all races, which has ever proved the universal bond of interest and union between the greatest minds of all nations.

That great gain to knowledge which laid Astronomy open to study every night, would altogether cast into shade pyramid observations which were mainly limited to a few persons during days near the

Equinoxes, consequently pyramid principles would soon be forgotten and eventually die out of tradition entirely—especially as thus far they had been kept secret. Hence we need not wonder that the Pyramid System has been lost to knowledge in past ages—just as the Sun-dial and Shadow-staffs, widely used a century ago, have now been forgotten by almost all but Antiquarians.

Thus Astronomy as the oldest of the Sciences, had a most urgent and practical origin, and the mere fact that illiterate men subsequently used the outlines of living creatures to aid their memory in grouping together stars into constellations, in no sense implies that astrological practices were first started.—More probably they arose through the subsequent development of the Priestly Class.

Scientists and Archæologists generally, appear to have been so absorbed in the learned controversies respecting the mystic Astrology, etc., of the Ancients, and imbued with the interest thus created, that they have overlooked the obvious fact that the Ancients were simple-minded plain-thinking men, whose most practical aim was directed towards finding out the "length of the year" as the prime factor towards improving their conditions of comfort in life.

They were not at first given to frittering away their energies in idol worship. That came later when the ascendency of the priestly class arose, through their exclusively acquired knowledge giving them the governing control over the essential great works of Pyramid and Temple Building, followed by Obelisks and other like works of national utility.

All the foregoing considerations impress us with the fact that the highest powers and greatest efforts of early men were employed towards developing our Almanac or Calendar for practical use in life, and that since then the leaders of men have ever prized and built upon that foundation-stone of true knowledge.

That thought should impress upon us the duty we owe to our common humanity, and the responsibility we have to future generations, to render the great Almanac work as perfect and practically useful as possible.

To those who are able to afford financial help towards furthering this cause, I frankly appeal for such contributions as they can afford, for it is obviously beyond the financial power of any poor man like myself to bear the necessary expense required to bring this subject before the public in a sufficiently wide-spread way, to overcome the natural lethargy of the people towards such plain social questions, after the excitement of the wars.

Yet I hold that this suggested simple Reform of the Almanac might appropriately follow the conclusion of the war, and prove one of those "bloodless victories of peace, which are not less renowned than those of war," for it would relieve the minds of all people from much absurd mystery, as well as wasteful and irritating mental computations of fluctuating Annual Times and Events which are constantly causing needless uncertainty and trouble to us all.

Further, it would enable us all to easily yet firmly grasp Almanac principles in our minds, so that we could instantly know the week-day and festival names of every day in the year, and most naturally fit the universal and essential weekly unit into the Months, Quarters, Half-Years, and Years, so as to greatly facilitate the payment of rents, rates, trading accounts, wages, and other expenditure within equitable periods, more exactly according with the time during which the income accrues.—In fact all Time adjustments between income and expenditure

I may here state that the patient labours of the late Professor Piazzi Smyth, Professor Petrie, and other pyramid investigators afforded trustworthy data upon which I could work and be assured of the actual pyramid facts; but as no one appeared to have clearly investigated pyramid shadows, I felt bound to pursue the enquiry, and when doubt was expressed by some of my scientific friends as to whether the pyramid shadow-edges could be clearly marked, it seemed my duty to take personal observations of the Great Pyramid, if possible, or, at any rate, investigate the facts at the Pyramid. When, therefore, my medical adviser ordered me abroad to the sunniest climate available, to get rid of serious throat illness, I promptly started for Egypt, though that meant a serious tax upon my limited means.

When I examined the Pyramid's Local conditions, and investigated the shadows upon the shadow-floor in Nov., 1900, they fully confirmed my anticipations.

Unfortunately I could not remain in Egypt to test the critical observation of the shortest decreasing shadow, which could only be proved in March, as the claims of a wife and five children needed my labor for their support; but I was fortunate in being most courteously received by that most eminent Egyptologist, Professor Maspero, who presides over the Antiquities Department of the Egyptian Government and the Gizeh Museum. He seemed greatly interested in my investigations, and most kindly offered to help me at the right time to secure photographic proofs of the Equinoxial shadows. I was therefore highly satisfied with my visit, even though whilst I was conversing with Professor Maspero a wily Arab stole out of the carriage my camera and negatives of the Pyramid observations I had taken.

Early in March, 1901, I timely sent detailed directions to Professor Maspero, but though my package was endorsed to be opened in his absence, it was re-directed from Cairo to him in Paris, and so delayed until too late for that year.

Meantime I submitted a rough proof of my pamphlet to Professor Petrie, whom I also had the pleasure of meeting, both in Cairo and during his interesting excavations at Abydos. He very kindly pointed out that the slope of the Great Pyramid is not exactly Equinoxial but 51° 51′. Then it seemed clear that the shortest shadow would fall about March 3rd, and it seemed as though my theory was shaken, but the more closely the utilities of the Equinoxial slope were investigated, the more fully I became convinced that the early Egyptians would be absolutely forced to adopt the Equinoxial slope, as that would not only enable them to completely determine the Celestial Equator at the Equinox, but further than that, the self-same slope would cut the plane of the Tropic of Cancer at the Winter Solstice as well as the Tropic of Capricorn at the Summer Solstice, whilst the apex of the Pyramid was a most admirable pointer or marker for noting the Seasonal paths of the stars as well. (In fact the Equinoxial-sloped Pyramid was the most perfect form of Observatory possible, until Pyramid Observers thereby not only discovered the exact length of the Year, but also applied that ascertained fact as the only possible basis for deducing the laws which govern the apparent movement of the stars, and thereby laid the foundations of Astronomy as we now understand it.)

I was then by gradual reasoning and deduction reluctantly brought to the conclusion that a change had taken place in the Latitude of Cairo during the last 5,000 years, but felt that such a theory would only be ridiculed unless I could find other proofs of such a change.

INTRODUCTION.

Being anxious to test the local conditions of the great Phœnician Sun Temple at Baalbeck, I sailed for Beyrout, and there had the good fortune to accidentally meet that renowned traveller and eminent Glacial Geologist, Professor Wright, of Oberlin University, U.S.A., and his son, Mr. Fred Wright, who together had during the previous year travelled through Northern Asia, to ascertain whether that quarter of the World had been under glacial ice when the Northern parts of Europe and America were covered by glacial action. Their thorough search disclosed the fact that Siberia had no trace of such glacial deposits, and as the geological and historical evidence shows that Europe is gradually getting warmer and Siberia getting colder (as evidenced by the mammoths, etc., now found embedded in the Siberian ice, and other indications), it appears very strong evidence supporting the conclusion I had anticipated in the change of Latitude caused by the shifting location of the Earth's Axis of Rotation, which Astronomical research seems to be gradually confirming.

When later study at that wonderful Druidical Observatory of Silbury Hill in Wiltshire showed evidence of a corresponding change of Latitude I became more confident that such change has all along been going on, and still continues; therefore, with all due deference to our scientific experts, I submit that conclusion in the belief that it also accounts for the wonderful variety we find in geological strata all the World over——in fact it evidences the almost infinite gradations of surface life and rest through which the World has evolved, and indicates that when our Coal Measures were laid this part of the World was evidently within the Tropics; when the Old Red Sandstone was formed the surface of this part of the globe was subject to such arid desert conditions as now prevail in Australia, Arizona, Sahara, Arabia, Thibet, etc., as evidenced by the microscopic identity of proof recently made by eminent geologists like Professor J. Goodchild, of Edinburgh, to whom I submitted specimens of the desert sands of Egypt, Syria, etc., which, by being wind-driven, have the polished grits rounded so conspicuously like the Old Red Sandstone, when viewed under the microscope, and yet are so distinct from the more oval worn sands shaped by sea and river action.

The past course traversed by the North Pole when marking its successive stages, as the changing position of the Axis of Rotation progressed, will take much research to determine; but so far, to my mind, the indications point the direction as from Greenland to the present Pole, which seems slowly progressing towards Kamtchatka. It seems as though a beneficent Providence had, by the extremely gradual progression of the Earth's Axis of Rotation, provided for the periodic rest and renewal of the World, and that the great Ocean Currents constitute an important agency in that work. It may even be that the path of Polar Axis change has repeatedly traversed and scoured out the beds of the Atlantic and Pacific Oceans whilst the geological strata were being laid. It is difficult to conceive how the Polar Axis could exist in oceanless areas and be maintained in its present position without endangering the stability of the World by the accumulated Ice and Snows, were it not for the steady relief given by Ocean Currents and the slow progression of the Axis of Rotation. Evidence upon these interesting points I will adduce later if time permits, as space here forbids, and it would be out of place to record here more than the fact that the idea was borne upon my mind as the result of my Pyramid investigations, when I had not the slightest idea that such changes had been thought possible by scientific men. Indeed, I hesitated for two years

before naming it to anyone, because it seemed so opposed to generally accepted ideas. Subsequent enquiries show that some geologists had raised that question, which appeared negatived by physical data. About that, however, we have yet much to learn.

It was not till the end of MARCH, 1902, that my convincing PHOTOGRAPHIC PROOFS were received from Egypt, through Mr. Quibell, the Egyptian Government's Chief Inspector of Antiquities—who had been requested by Professor Maspero to get the Great Pyramid's critical shadow photographs, in accordance with my directions. They are reproduced herein, along with the interesting facts connected with their record, and seem to so conclusively prove my theory as to the OBJECT FOR WHICH THE PYRAMIDS WERE BUILT that it now seems right to issue this Publication which has been so long delayed.

The original idea of Almanac Reform being desirable was forced upon me at Christmas, 1884, and was strongly impressed upon my mind by the business and social inconveniences which arose during the Christmases of 1894 and 1895, when Christmas Day fell upon Tuesday and Wednesday respectively, upsetting our ideas of those weeks, and causing unnecessary confusion through altering Market Days, etc., whilst much heartburning was caused by tradesmen curtailing the holidays of their toil-worn employees to get them back for Friday and Saturday's turn-over at the shops. In 1901 Christmas Day fell on Wednesday, whilst this year (1902) it falls on the Thursday, which is almost worse, as the Saturday Markets will only be held in a half-hearted way at much inconvenience, and spoil the well-earned holiday of millions of toiling people;—whereas my proposal would always keep the Markets, Business, and Social arrangements undisturbed in their usual weekly course.

The mystifying, senseless fluctuations of Easter, when fairly considered, are found to be so needlessly inconvenient, wasteful, and generally bad in their effects, without adequate compensating advantages, that it almost seems a crime against humanity to longer perpetuate them.

The remedy suggested to my mind seemed so simple that I mentioned it to several friends, who thought it highly desirable. Amongst them, Dr. Tempest Anderson, of York—(not of New York, as the newspapers wrongly described the able scientist who was sent out by the Royal Society in 1902 to investigate the Volcanic Eruptions in the West Indies)—who encouraged me to proceed; I however expected that the unfortunate conservatism which has so often led the Churches to oppose Reform in the past would lead to undue opposition, but conversation in 1898 with the Bishop of Truro and later with other influential men of the Established Church and Nonconformists, as well as the very influential Papal Authority of the Roman Catholic Church, with whom I was privileged to discuss the matter in Rome, lead me to believe that there is a very fair chance for at least the first two steps of the suggested Reform being carried into effect within reasonable time, if tactfully worked for, and the Public are led to realize the simplifying advantages and conveniences which such Reform would bring.

Christmas, 1916, is, for several reasons, suggested as the most opportune date for initiating such needed improvement, which however could take effect, without any appreciable inconvenience, whenever Christmas Day falls upon the present style Monday.

Heavy business demands upon my time have handicapped these efforts towards the elucidation of the great questions raised herein. The end page list of

my works evidence the fact that I have not had leisure to deal with these subjects as completely as would have been done if I had been free to give more time to their investigation. As only scraps of time (frequently separated by long intervals) could be devoted to them, the record may in parts appear patchy, especially as all through I have had to be most rigidly economical, and consequently forced to stereotype the successive pages of the "Pyramid" and "Bible Ages" Sections, to liberate the type needed for the remainder. That involved the compression or extension of any subsequently developed evidence within rigid limits, as instanced at pages 78 & 154, etc. where the Pyramid-Shadow Records and Proofs of the Half-Yearly Breeding of Sheep, etc., were inserted.

Literary style has not been attempted, but plain efforts have been made to record the complex matters in simple language, so that the general reader may understand how these ideas were gradually unfolded and developed.

The mental activities of most people are now-a-days so engrossed with mere money-making and the selfish pleasures that trend of thought enjoins, that it seemed evident that any mere statement of the desirability of Almanac Reform would fail to attract the attention of the masses of the people unless subjects of remarkable interest connected therewith could be brought to arouse their attention, so that readers might realize the superior advantages of the proposed Almanac Reform,—That is mainly why the problems of the Bible Ages, Pyramids, Change of Latitude, etc., have been dealt with; but they were unquestionably brought to my mind through studying the natural means by which men alone could have developed the Calendar.

Even the slight digressions made to matters indirectly affecting these subjects, are intended to illustrate such matters with sufficient clearness and yet within reasonable limits, whilst sustaining the general interest. These added much to my work, yet they will bring their compensations.

Such illustrations as my limited time and means could afford have been given to explain the points raised, and continue the reader's interest.

It is my pleasurable duty to acknowledge my indebtedness to the late Professor Piazzi Smyth, who so willingly helped and encouraged me by his kindly interviews and advice whilst he laboured under great affliction. I desire also to record the kindly courtesy accorded me by Professor Maspero (Cairo), Professor Flinders Petrie (London), Professor Frederick Wright (Oberlin, U.S.A.), J. W. Brooke, Esq., the well-known Antiquary, of Marlborough, and others in this difficult task.

My first idea of issuing a penny pamphlet advocating Almanac Reform, has from the nature of the subject expanded to include these highly interesting points in PYRAMID DEVELOPMENT, DRUIDICAL OBSERVATIONS, and the earliest recorded AGES of MEN, so far as they have been disclosed in my Almanac Research. The cost has thereby been so far increased, that it is not possible to publish the results at less than one shilling. I have already spent more money and time upon this work than can be afforded in justice to my family, and though it is not completed to my liking, it must be issued now to insure adequate consideration and action before Christmas, 1916.

The extended labours made such demands upon my time that in the hurried investigations required I have naturally stumbled at times, as any man would who essayed to solve these complicated problems.

For instance, after my experience with primitive stakes, sighting-staffs, shadow-poles, etc., had convinced me that the year's length could only be accurately found out by early men studying the daily varying sun-shadows cast from pyramids or cones of great height, my conclusion was laid before Dr. Tempest Anderson, who, knowing Professor Piazzi Smyth, and having his book (which I had not seen before), kindly lent it to me Naturally, my first look into that work was to trace whether there was any evidence of shadow-records or of a shadow-floor.—Finding that though it was not named as such, Plate VIII. proved that such a shadow-floor existed at the midway footing of the Great Pyramid's Northern Slope, exactly where my theory led me to expect it, I desired next to know whether the Slope cut off the Shadow about the Equinox, so learning that the author of "Our Inheritance in the Great Pyramid" had been Astronomer Royal for Scotland, and lived at Ripon, I wrote requesting an interview to make sure of my facts, as I practically knew nothing of Astronomy. That favour was courteously afforded me, but as the aged Professor was then suffering from over-work, and could only speak very indistinctly, the interview under medical orders had to be restricted to fifteen minutes, so the utmost had to be made of the time.—To my first question, as to whether the shortest pyramid shadow fell about the Equinox, Professor Smyth replied, "Yes!" and on my asking if he could inform me the date, he referred to an old Nautical Almanac, and was understood through his muttered words to say March 25th, whereas it is now quite clear he meant March 5th, as that Almanac's record shows the Sun's declination on March 5th as=7° which plus the 52° Pyramid angle plus 30° Latitude with fractions = the 90° Quadrant, whereas on March 25th the declination being 1° North, it is clear that there could not have been any Noon-Shadows cast from the Great Pyramid during the 20 days intervening from March 5th to March 25th.

Hence March 25th was wrongly stereotyped in the front page of the "Pyramid" Section, and misled me into undue expense and delay in getting my final Pyramid proofs.

But even that had its compensations, as it led to closer study of the Equinoxial basis of my Pyramid research, till experiments at the Pyramids proved that the critical Shadows now fall at an earlier date, owing to the gradual change which has taken place in the Latitude during the 5,000 years which has elapsed since the Pyramids were built, as it seems certain from my Sphinx observations that the Pyramid builders fully realized that they had to depend upon an Equinoxial Slope to get the truest results by Equinoxial observations.

I have endeavoured to produce the book as economically as possible (by printing contract and issuing it upon my own responsibility, thereby saving publisher's profits), to secure that wide reading and interest which was requisite to ultimately secure the effective public and International Action essentially needed to carry out any such Reform

By publishing the work direct I have retained freedom to express my own thoughts, without being fettered by the whims or moneyed interests of Publishers.

On the other hand, I had to give sufficiently explicit details to obviate that influx of correspondence which experience proved (by the many letters already received which I have not been able to find time to answer)—that time would never allow me to materially increase my correspondence.

In the interest of Truth it seemed best to record the facts and ideas as they gradually developed during my enquiry by reasoning upon natural lines.

The remarkable conclusions at which I arrived respecting the rational origin of the early Bible "Year" Records, so far as they were disclosed by the gradual development of the Year knowledge and Time methods of the Israelites, are detailed to represent my views and obviate protracted arguments.

But for the South African War absorbing so much attention, these proposals would have been published towards the end of 1899, as all except the Pyramid Shadow Photograph were completed then; but it was deemed best to delay the issue until after the war, to ensure fairer consideration in quieter times.

Part of my proofs, which were issued to private friends during the years 1898 and 1899, got into other hands, and shortly afterwards unauthorised articles thereon appeared in the "Sunday Mail," which was then struggling into existence, and amongst others, in "Nature," to which Dr. Tempest Anderson (who had seen some of my proofs) kindly drew my attention by post-card.—Subsequent articles have appeared, but I could not afford time to deal with them without delaying this issue, which has already been retarded too long, besides which, it seemed best to adhere to my original plan.

Whilst writing these last two pages of Introduction on November 24th, 1902, when this issue was practically completed, I learn with great pleasure that some American friends of progress are advocating the sub-division of the year into thirteen months. That I have all along felt to be the most difficult task to accomplish in Calendar Reform. So far I have not been able to find in what way they propose to arrange the thirteen months, and as it would delay this issue (which cannot now be published until after Christmas, 1902) another season if I waited to get such American particulars, it seems inadvisable to let this opportune Winter pass, especially when the publication has already been delayed nearly three years through the War, and during that time my years of labour and heavy outlay have locked up my available means.

No time shall be lost in ascertaining such scheme, which shall be included in the next edition, and if it then proves to be better than any part of mine, I shall cordially support it.

Therefore I gladly welcome the news that our thorough-going and energetic American friends are becoming alive to the need of this Reform, as if they set to work with their usual go-a-head earnestness, this Reform will be carried through, and all nations will soon learn to appreciate its many and far reaching benefits.

In conclusion, I may say that though I have searched the records, etc., within my reach, I cannot find that, beyond the above references, anyone else has previously opened up these proposals for Almanac Reform, the utility of the Pyramids for finding the length of the Year by studying their Shadows, the research into the gradual Evolution of the Year by gradations from the Month to the Year, and thereby the Solution of the Bible Ages of Men, etc.; therefore it seems my duty to submit them to the reader's consideration and judgment, in the hope that if they are found worthy of support, such readers will use their influence to secure RATIONAL ALMANAC REFORM.

INTRODUCTION

The magnitude of the task of Almanac Reform should not be under-estimated, and I fully realize that it is impossible to deal completely with these vast issues in this small book. That it requires funds to secure the needed great and united effort is apparent; therefore I shall be glad to receive contributions. Meantime, I purpose devoting my spare time and energies in future years to advocating the great public conveniences and utilities which would result from this Reform.

Fortunately I have always been enured to long hours and heavy work, as early struggles when a student regularly called me to rise at 4·0 a.m. to get in the seven hours study per day, which was rigidly planned beyond my regular business work, which happily varied the mental strain.—By careful variation I have been able to continue my fourteen hours work per day, till now when the long series of my "Calculators, etc.," are practically completed to relieve the mental strain; I, therefore, feel more free to devote time to further this needed Almanac Reform.

With a view to keeping the question prominently before the public, I shall endeavour to issue enlarged and improved editions, before each Christmas, embodying further facts and evidences bearing upon the problems dealt with herein as developed during each year.

I may therein reply to some of my critics who raise reasonable objections without seeking to waste my time, though I will not be led into religious controversies, but seek to deal with what is necessary, or reasonably dispose of objections and difficulties which may be raised. Such additions, etc., will be distinctively recorded, so that the persons interested in advocating this desirable Reform may readily grasp what is new, and see by each yearly record of the work, what progress is being made in this and other countries towards attaining this most desirable Calendar Reform.

Arrangements are being made to issue similar editions in FRENCH, GERMAN, RUSSIAN, SPANISH, ITALIAN, etc., in styles suited to those countries, to be followed in other languages when Funds permit.—Meantime, a superior Edition in larger type and better book-form is being set up in America.

Our ancestors having repeatedly amended the Almanac according to their then best knowledge and needs, it surely is the duty of our present highly developed civilization, to rise to the occasion during these early years of the 20th Century A.D., and quit ourselves like progressive men, by doing our share towards simplifying the great ever-present Almanac and Time problems which can best be met by true Almanac Reform, for the benefit of present and future generations.

Reader, will you please do your share towards rationalizing Almanac Work for the 20th and future Centuries?

May I ask readers who favour these suggested Reforms, to fill up and return to me the enclosed post card, notifying their support, and follow that up by kindly using their best efforts to enlighten public opinion by bringing the question before Members of Parliament, Public Authorities, and their friends, to ensure practical results?

M. B. COTSWORTH.

Holgate, YORK: Xmas, 1902.

OUR ALMANAC.

The names "Almanac" and "Calendar" have both been so generally applied to our printed records of the Year that they are now regarded as synonymous. We therefore use them both for the like purpose, though originally the name "Almanac" was only applied to the notched-sticks (clogs) and like primitive means which any individual was at liberty to use for recording the progress of the days of the Year, whereas the name "Calendar" was reserved to the official record of Festivals, Holidays, Saints' Days, and ordinary days, to denote the progress of the Seasons throughout the Year. The Calendar literally denotes the *settled and national mode* of registering the days of the Year as the Sun appears to progress through the Seasons; whereas Almanacs are subsidiary manuals or tabular records based upon the National, Official, or Church Calendar, with the Festival Dates, etc., of which all Almanacs must agree within their respective countries.

Long and careful consideration of the conditions under which early men lived, and the primitive means then available for observation of the Seasons, convinces me beyond the possibility of doubt, that the earliest period of long-time count (beyond the inevitable day) must have been by the Moon or month.

It appears impossible to conceive that they could have discovered the length of the Year until centuries of careful observation forced them to the conclusion that the Sun's varying elevations caused the Seasons. These they were compelled by self-interest to watch from the time they began to sow seeds to provide their yearly food.

Detailed experiments and investigation have convinced me that there were two definite and inevitable methods of Seasonal observation which early men had of necessity to adopt. These were:—

THE 1ST "AMPLITUDE" OR HORIZON METHOD of measuring the varying Seasonal points of Sunrise and Sunset, first by the undulations along the horizon, and later with more exactitude by sighting-stakes or rods, such as I believe Jacob used to find the right time to mate his flocks whilst serving Laban (as explained on Pyramid page 153, and Bible Ages page 11).

That crude method has been used by primitive races nearly all over the world, and was the simplest and most suggestive means they could apply; but as they could not get accuracy by it, the growing needs of increased population under higher civilization necessitated truer efforts, as will be explained in the Pyramid Section hereof.

The Moon-counting of Time, with its subdivision into weeks by the Moon's phases, would early become so habitual that it seems fairly certain that it would continue almost throughout the Amplitude Age, of which the Sphinx seems typical.

OUR CALENDAR WAS INEVITABLY DEVELOPED BY

THE 2ND "PYRAMID" OR SHADOW METHOD seems to have been inevitable to secure the accuracy required to form a Yearly Calendar, as the Ancients could only trace the Sun's movements sufficiently exact by the inverse process of recording the Variations of the Sun-Shadows cast from Pyramids, Cones, etc., of great height, as I will later prove. From those huge erections the more convenient Gnomons, Sun-dials, etc., were ultimately developed.

I am convinced that the true length of the Year was never found out until after the Pyramids were built to solve that greatest problem early communities had to solve, for until that gave the measure of apparent yearly motions of the Stars it would be quite impossible for star observers to locate the Seasonal positions of the Stars, whilst obviously, as they saw that the Sun caused the Seasons, they could not be expected to seek the solution of the Year apart from the Sun as its cause.

That the term "Year" grew by stages from 1 month to 5, 6, and then 12 months seems fairly evident when the Bible records are rationally analysed, as briefly shown in the Bible Ages Section. But whilst that should appeal to fairminded readers, it is only part of the proofs we have of such gradual growth of men's knowledge.

It is an undoubted fact that Romulus, who founded the Roman Empire 754 B.C., used the 10 months' year of 304 days, from which we derive the names of our last 10 months, *e.g.*, Dec. (10th), Nov. (9th), Oct. (8th), Sept. (7th), etc.—January and February were added by Numa later. It may be interesting here to note that such 10 months' Year was used in Noah's account of the Deluge—see "Bible Ages," page 8. Evidence has recently been discovered which proves that the Arabians and Arabs originally had a 10 months' year.

The Pontiffs and leaders of the Church long exercised and tenaciously held to their prerogative of fixing the "Calendar," and anyone else who dared to compile a "Calendar" was liable to severe penalties. The reason for that is obvious, because so long as the people had to be dependent upon the Priestly declarations on Sundays, etc., for information as to the progress of the Seasons and the Year, so long must they of necessity go frequently to Church and uphold its establishment, as will be shown later.

The power of fixing the Calendar tempted early Rulers and Pontiffs to lengthen their periods of office, and so acquire more power and wealth by extending or curtailing the Calendars for their years of office to such an extent that the resulting confusion and suffering of the people led Julius Cæsar to bestow the great blessings of his Calendar Reform in 45 B.C., with its Leap-Year adjustment.

Mr. Jas. C. Macdonald, in his "Chronologies and Calendars," page 14, says: "The Roman "Pontiffs, in exchange for private bribes, began

"to corrupt and falsify the Calendar Rolls. "They at times, for instance, ordained special "intercalations (sometimes inserting an extra "month in the year) so as to favour a moneyed "friend who wished to retain an office, or they "failed to announce the annual additional days "when justly needed, because some wealthy "legate wished to return to the Eternal City "before his regular time of recall. But as the "art of the Pontiffs, which had become an "artifice, was not understood by the people, "those chronological (Calendar) tricks passed "unheeded for a long time, consequently the "Civil (announced) and the Solar (Seasonal) "Year fell months out of time. Consuls who "were supposed to enter upon office in January, "began their duties in the preceding October. "Festivals came to be held in unnatural "Seasons; for instance, the Feast for Flora "(the Goddess of Spring) was celebrated in "the middle of July."

We may judge how easily the illiterate people of those days could be misled, by the fact that the Years were counted by 12 moons as 354 days, with bi-annual additions of 22 days to make 1,460 days in 4 years.

Such selfish tricks were often played upon other Calendars in more ancient times, but Julius Cæsar's wise reform, backed by his great power, practically put an end to them throughout the vast Roman Empire, and so laid the basis of our European Calendars.

Will readers please bear these fraudulent lengthenings and reductions of the Year in mind, as I shall later show on pages 163, etc., of the "Pyramid" Section of this book, that Joseph's 7 years of Plenty, followed by 7 years of Famine, were caused by that abuse, but with the grand object of the Nationalization of the Land, to the inestimable advantage of Pharaoh and the Egyptians.

We should not view such artful schemings as if they were attempted under present conditions, which are so widely different from those of 4,000 years ago. Similar questionable practices of the Church in the Dark and Middle Ages were far less open to censure then, when the standard of public opinion and dealing was vastly lower than now: therefore I trust that any good Catholic or Churchman (for many of whom I have very high regard) who read herein any reference which might otherwise be regarded as derogatory to their beliefs, will kindly bear in mind that I have to bring out the facts to deal with the Calendar, and certainly do not desire to hurt anyone's susceptibilities.

Throughout the long history of the Calendar the continuation of these schemings to further the interests of selfish Rulers or Classes has caused the many confusing and inequitable anomalies of unequal months, etc., which we now experience in our Almanacs. *e.g.*, Julius Cæsar renamed Quintilis (5th month) July, and gave it 31 days, as he was born in that month.

Augustus Cæsar followed, and re-named Sextilis (6th month) August, which then had 30 days, but as he could not bear to think that Julius Cæsar's month had one day more than his, he took another day from February, which then had 29 days, to make the 31st day of August.

Similarly, the foolish 5-weeks' range of moon-wandering dates for Easter was arranged to suit the supposed interests of the Church, without due regard to the innumerable inconveniences, indirect losses, and trouble it has since caused to the people, as will later be shown.

In those days the dominant idea was what will best suit the Church?—not, what is the best and simplest for humanity?—as should have been the ruling thought.

Investigation into the History of the Calendar shows that the many other strange inconsistencies and anomalies with which we are still trammelled arose from similar selfish or thoughtless causes; therefore they should not longer continue to increase our Almanac inconveniences, which become more aggravated as the pace of modern business, social, and public life yearly becomes accelerated.

Most of the following proposals for Almanac Reform were written at odd times during the years 1896 to 1899, and set up in type ready for issue in November, 1900, but the outbreak of the South African War made it inopportune to issue this book then, so it was delayed, especially as I then had to go to Egypt to restore my health, and hoped by further enquiries there to establish more surely the evidences I had been able to gather, as well as complete my experiments and photographic proofs to make the work more likely to help forward this desirable Reform.

I submit that we cannot devise a more appropriate, useful, and lasting means to celebrate and commemorate the "20th Century" than by sub-dividing future years in the best possible way to facilitate the every-day use of our wonderful Almanac, and thereby promote the general convenience as well as foster the friendly intercourse of our common humanity the wide world over, above the distinctions of race or creed.

The more fully we investigate the interesting History of the Almanac's development, the more surely we are forced to the conclusion that, beyond all question, the Ancient discovery of the length of the Year marks the most important knowledge men have been able to disclose from Nature, and that the subsequent gradual growth of the Almanac is due to the strenuous efforts of many of the best minds with which humanity has been endowed through the vast ages of men's existence.

The conservancy which has been naturally built upon the hoary traditions of the Calendar has hitherto prevented us from examining the Almanac in that Rational light which will enable us to see that, though the still existing variations of the Almanac may have served

admirably during the Middle Ages, and were passable until the last Century, they have long since not only ceased to be of real advantage, but have become an irksome anomaly, fettering our day-life, instead of giving those easily-adopted additional facilities which wise improvement should have developed to meet the increasing needs of modern life.

The following scheme is submitted to prove that there can be no doubt about the possibility and advisability of providing such a simple Almanac as could be most readily carried in the minds of everybody, to their great advantage, without their being encumbered by those irrational and troublesome interchanges of week-day names for the dates in the months and year. The still more confusing and greater folly of erratically moving the Festivals by the changing moons over a period of 5 weeks could also be avoided, whilst business and public convenience would thereby be greatly improved.

The useless complexities of the various Calendars in use were designed centuries ago, mainly for ecclesiastical purposes, when the educational, administrative, etc., functions were governed by Church influence, whilst international trade and intercourse barely existed.

Then, the conditions of life were widely different from those of our time, as the inventions of later centuries, particularly of the "19th Century," have led to such facilities of transport and business development that the every-day transactions and arrangements within all Civilized Countries have multiplied beyond all appreciable comparison with those of centuries past, whilst the innumerable business transactions between people of different nationalities are constantly increasing.

All these involve such widespread and incessant application of Almanac dates, and the repeated reference to printed Calendars, as will astonish all who consider how often they have to make such tedious references, all of which might be obviated by the adoption of a "Rational Calendar."

Fortunately, the "Gregorian Calendar" is used by the most powerful and great majority of the civilized peoples in the World, and as it so well provides the first Calendar essential of keeping the length of the Year in accord with the Seasons, by its Leap-year adjustment, there can be no hesitation about taking that as the basis of any suggested Almanac Reform, because it is the most widely adopted, and the best in use.

Unquestionably, the full Year thus instituted must be maintained, and any alteration confined to the sub-division of the Year into the best possible periods for general convenience.

The present is a most opportune time to deal with this great question for the common good of all, as the Russian Government has now decided to adopt the Gregorian Calendar, and so conform to ours which is already in use through Europe, America, Australasia, about half of Africa, and extending over Asia.

The Proposed Calendar suggests the following alterations from the Present Style :—

1. The allocation of Christmas Day as "*The Special Day*" or "Year Day" it really is—a day apart from all others, without any week-day name—to obtain *uniform week-days* on the *same dates* in future years, by eliminating the useless alterations of week-days throughout the dates of each Year.

That would secure very real advantages and conveniences which would result from having definitely fixed names for each day of the Year, as is explained later.

The extra day in Leap Year should be likewise treated as the "*extra day*" it undoubtedly is, and it is proposed that it should be regarded as an extra holiday, to be named "Leap-day," and fixed on a more suitable date than being dumped down haphazard at the end of February.

2. It is proposed that the Holidays and Festivals (such as Easter and Whitsuntide) should be *fixed* at their most convenient times for the convenience and pleasure of the people, instead of being *movable* as now—causing widespread inconvenience to public and business interests, without any adequate reason or real advantage.

3. The grouping of the remaining 364 days of the year into *13 months of 28 days* (*4 weeks*) *each*, by inserting a *new month* midway in the year (between June and July)—such new month as being yet un-named, though the tentative name of "Sol" the (Sun)—is, with others, mentioned for consideration. This would do away with the great inconvenience experienced through the varying lengths of the present months which cause the various days of the month to fall on different week-days. It would obviate the present 5 week-ends erratically occurring about every three months. In place of those defects we might ensure the widespread advantages of *simplicity and uniformity for all the months*, as well as *equality* in the duration of the Quarters and Half-Years for public convenience and business comparative purposes. —Very many real advantages would result from the use of such a simplified Almanac.

Thus it is simply proposed that all the Day-names of each year should come round regularly and evenly in the most natural and best date order; months, quarters, half-years, and all other times of earning and expenditure would then be equitable and fair for everyday and universal use; whilst the whole of the "Rational Almanac" could be easily borne in mind without the trouble and worry of constantly referring to the present erratic, complicated, and antiquated Calendar, as all the dates with their week-days could always be instantly known from the simple "permanent month" (as shown on the front cover) which everybody could readily remember.

A Rational Almanac.

By comparing the two Calendars, printed side by side below for comparison, the uniform simplicity of the "Proposed Future" Almanac, in contrast with the irregular and complicated "Present Style" arrangement of Calendar, will be instantly seen, even by the most casual observer, whilst fair consideration of the following remarks, together with facts which the reader's mind will readily recall from experience, will prove that the proposed change would be a real help in our daily life, whether considered from its domestic, commercial, church, holiday, social, governmental, or international points of view.

PRESENT (1902) STYLE. (*Variable.*)

No. of Days in Qrs. and Half Years.	Month	Sun.	Mon.	Tues.	Wed.	Thu.	Fri.	Sat.
	JAN.	1	2	3	4	5	6	7
		8	9	10	11	12	13	14
		15	16	17	18	19	20	21
		22	23	24	25	26	27	28
		29	30	31	...	...	...	...
	FEB.	...	...	...	1	2	3	4
		5	6	7	8	9	10	11
		12	13	14	15	16	17	18
		19	20	21	22	23	24	25
		26	27	28	...	...	...	...
Days.	MAR.	...	...	...	1	2	3	4
		5	6	7	8	9	10	11
		12	13	14	15	16	17	18
		19	20	21	22	23	24	25
		26	27	28	29	30	31	...
90	APR.	...	...	...	...	...	...	1
		2	3	4	5	6	7	8
		9	10	11	12	13	14	15
		16	17	18	19	20	21	22
		23	24	25	26	27	28	29
		30	...	...	...	...	...	...
	MAY.	...	1	2	3	4	5	6
		7	8	9	10	11	12	13
		14	15	16	17	18	19	20
91		21	22	23	24	25	26	27
		28	29	30	31	...	...	...
	JUNE.	...	...	...	...	1	2	3
		4	5	6	7	8	9	10
		11	12	13	14	15	16	17
		18	19	20	21	22	23	24
181		25	26	27	28	29	30	...
	JULY.	...	...	...	...	...	...	1
		2	3	4	5	6	7	8
		9	10	11	12	13	14	15
		16	17	18	19	20	21	22
		23	24	25	26	27	28	29
		30	31	...	...	...	...	...
	AUG.	...	...	1	2	3	4	5
		6	7	8	9	10	11	12
92		13	14	15	16	17	18	19
		20	21	22	23	24	25	26
		27	28	29	30	31	...	...
	SEPT.	...	...	...	...	...	1	2
		3	4	5	6	7	8	9
		10	11	12	13	14	15	16
		17	18	19	20	21	22	23
		24	25	26	27	28	29	30
	OCT.	1	2	3	4	5	6	7
		8	9	10	11	12	13	14
		15	16	17	18	19	20	21
		22	23	24	25	26	27	28
		29	30	31	...	...	...	...
92	NOV.	...	...	...	1	2	3	4
		5	6	7	8	9	10	11
		12	13	14	15	16	17	18
		19	20	21	22	23	24	25
		26	27	28	29	30	...	...
	DEC.	...	...	...	...	...	1	2
		3	4	5	6	7	8	9
		10	11	12	13	14	15	16
		17	18	19	20	21	22	23
184		24	25	...	...	...	...	...
		...	26	27	28	29	30	31

PROPOSED FUTURE STYLE. *To be fixed from Christmas, 1916.*

Week No.	Sun.	Mon.	Tues.	Wed.	Thu.	Fri.	Sat.	Month	Days in proposed 1/4 Years.
1	1	2	3	4	5	6	7	1 JAN.	
2	8	9	10	11	12	13	14		
3	15	16	17	18	19	20	21		
4	22	23	24	25	26	27	28		
5	1	2	3	4	5	6	7	2 FEB.	
6	8	9	10	11	12	13	14		
7	15	16	17	18	19	20	21		
8	22	23	24	25	26	27	28		91
9	1	2	3	4	5	6	7	3 MAR.	
10	8	9	10	11	12	13	14		
11	15	16	17	18	19	20	21		
12	22	23	24	25	26	27	28		
13	1	2	3	4	5	6	7	4 APR.	
14	8	9	10	11	12	13	14		
15	15	16	17	18	19	20	21		
16	22	23	24	25	26	27	28		
17	1	2	3	4	5	6	7	5 MAY.	
18	8	9	10	11	12	13	14		
19	15	16	17	18	19	20	21		
20	22	23	24	25	26	27	28		91
21	1	2	3	4	5	6	7	6 JUN.	
22	8	9	10	11	12	13	14		
23	15	16	17	18	19	20	21		
24	22	23	24	25	26	27	28		
25	1	2	3	4	5	6	7		
26	8	9	10	11	12	13	14		182
27	15	16	17	18	19	20	21	7 SOL.	
28	22	23	24	25	26	27	28		
29	1	2	3	4	5	6	7	8 JUL.	
30	8	9	10	11	12	13	14		
31	15	16	17	18	19	20	21		
32	22	23	24	25	26	27	28		
33	1	2	3	4	5	6	7	9 AUG.	
34	8	9	10	11	12	13	14		
35	15	16	17	18	19	20	21		
36	22	23	24	25	26	27	28		91
37	1	2	3	4	5	6	7	10 SEP.	
38	8	9	10	11	12	13	14		
39	15	16	17	18	19	20	21		
40	22	23	24	25	26	27	28		
41	1	2	3	4	5	6	7	11 OCT.	
42	8	9	10	11	12	13	14		
43	15	16	17	18	19	20	21		
44	22	23	24	25	26	27	28		92
45	1	2	3	4	5	6	7	12 NOV.	
46	8	9	10	11	12	13	14		
47	15	16	17	18	19	20	21		
48	22	23	24	25	26	27	28		
49	1	2	3	4	5	6	7	13 DEC.	
50	8	9	10	11	12	13	14		
51	15	16	17	18	19	20	21		
52	22	X	..	..	..	..	..		183
	..	23	24	25	26	27	28		

BRIEF OUTLINE.

The vast millions of the people are all daily arranging times and dates by the old cumbersome moon-wandering calendar as constructed by the Church in the days of serfdom and vassalage.

Custom has so long burdened us with its irksome anomalies that at first thought we are unable to realize the cumulative waste of energy, time, and labour thereby entailed in everyday life. We are always referring to the Almanac instead of having a simple arrangement by which any question respecting our time records would be immediately solved. The present awkward division of the year into irregular months, with moving Easters, etc., and the days of the week occurring on different dates in succeeding years, is absurdly unsuited to present day needs. Easter now fluctuates between March 22nd and April 25th, to the bewilderment of all and the benefit of none. A general idea exists that with Easter warm growing weather comes, consequently Good Friday (the poor-man's-garden-day), *quite regardless of the five weeks variation*, is taken as the right time to plant potatoes, so that probably thrice the quantity of any other day of the year are then planted—to the detriment of those Church observances for which it was established. Frost comes after early Easters and widespread loss is caused to the poorest and thriftiest families as was the case this year.

Again, we change our sports at Easter from *football*, which keeps the players moving and warm enough, to cricket, in playing which three-fourths of the players are standing. This we do even when early Easters fall in the month of March with its east winds—as last year—and then we wonder why so many cricketers have bad colds. Should we not rather use common sense and see that these are but examples of the many troubles and inconveniences which arise through the senseless movement of Easter over that 5 weeks in the year in which the weather probably varies more than any other 5 weeks of the year, to the vast majority of civilized mankind?

The year 1898 had 53 pay-days for those paying on Saturdays, but only 52$\frac{1}{7}$th weeks' earnings. (That anomaly recurs about every 7 years.) Five week-ends generally occur in 5 months, whilst only February accounts are proportionate to general expenses,—whereas by fixing the weekdays and Festivals, and providing for the division of the year into 13 months of 28 days (4 weeks), all would be equitably adjusted and the *great advantage of uniformity in the Festivals, Months and Week-days* of future time would be gained. Then we could with mental ease grasp the whole Almanac and know every day with its date from memory without referring to printed Almanacs or troubling our minds with the present erratic oddments of months, etc. We should then have the whole Almanac permanently "in our minds," *so that even the number of days between any dates*

could be instantly told by simply knowing the 12 times table up to 28 (as those who reduce lbs. to qrs., etc., already do).—Thus :—(proposed style)

To 14th Nov. (*12th* month)
From 5th Feby. (*–2nd* month)
9 + (10×28) = 289 days.
Mos. days

This year only the month of May ends with Saturday, hence the 11 split weeks, entailing 11 extra series of accounts, summaries, and balances in the other 11 months, will cause an absolutely needless waste in time, labour, etc., of about 10 per cent. on the whole year's working of railway station accounts alone.

To get reliable results all business houses the world over have to adjust wages, &c., for the "odd-days" each half-year because :—

Now the 1st half of the year has only 181 days,
Whilst the 2nd „ „ has got 184 „
And the "Quarters" (3 months) have got 90, 91, 92 and 92 days,
But "Lady Day, etc., Quarters" have 91, 97, 87 and 90 days.
Worse still, "Scotch Terms" have 102, 78, 102 and 83 days.

All Qrs. should be even 91, except Xmas Qr. (92).

The vast bulk of rents, rates, dividends, interests, etc., are paid half-yearly and quarterly, but the above proves their *inequalities* in "earning-time."

This jumble is accentuated when the Quarter-days, etc., fall on Sundays; in any case *each year* they alter to different days of the week, and must by the present style fall on all the seven days of the week during successive years.

Whitsuntide, etc., likewise vary with the Pascal Moons. Even August Bank Holiday (fixed during this generation) is varied in date.

In mentally reckoning the number of days to fix appointments, etc., on given days of the week we now have to keep in mind the day of the week on which each month begins.

These disturbing causes would be avoided by carrying out the proposals submitted herein. Moreover, if agreed upon, the change could be most easily introduced at Christmas, 1916. As there is no adequate reason for this awkward and erratic arrangement of the months, nor the alteration of the Festival dates following the moon, *why should we longer continue this illogical turmoil?*

The efforts of Almanac constructors in the past to fit the moon periods (months) into even divisions of the Civil year, with equal distribution of the 365 days among 12 months, are manifestly impossible, as 12 will not divide 365 evenly, therefore 12 months of the same length cannot include all the days of the year. Moreover, the Lunar Months range nearly 12⅓ per year.

They strove to maintain twelve months because they desired to have half-yearly and quarterly divisions, which I submit are much better derived in practice from my proposed Calendar which would secure these periods of 13 weeks each, all clearly defined and ending in complete weeks.

The first consideration should be to meet public convenience by securing equal divisions of the year into those periods which are best adapted to the everyday life of the people in our own and future time.

THE FIRST STEP.—(*Essential to my plan.*)—*Add Christmas Day to the days of Christmas-week, and thereby adjust the week-days throughout future years to fall on uniformly fixed Almanac dates.*

For reasons explained further on I propose that from Christmas Day, 1916, we should *regard* "CHRISTMAS DAY" *by itself* as the extra day (X) or *year-day* it virtually is, since it actually adjusts the year in Christian countries and really begins the basis of the Calendar. It should not be called a Sunday or other day of the week, but simply "CHRISTMAS DAY." The "Boxing Day" should be called Monday, then Tuesday, etc., to Saturday would end the eight days week and the year together, bringing Sunday (the 1st day of the week) to be "New Year's Day" each year—a further convenience to our Scotch friends, who could thus always have the week-end advantage and a holiday on the Monday. Hence this would tend to the happiness of family re-unions, whilst the fact that both holidays were preceded by a Sunday would help to restrain rowdyism.

Thus we should get rid of the ODD DAY *which now alters the days of the week for every date in following years* THIS WOULD SECURE WEEK-DAY UNIFORMITY THROUGHOUT EVERY YEAR (Leap year being likewise adjusted as below,) and ensure Christmas *always* falling on the most convenient day, so that the shops, warehouses, works, etc., would always be closed on Sunday, Christmas Day, and Boxing Day, for three clear days holiday to their millions of tired workers, who could then rejoice in that "boon and blessing" to all.

We are obliged to have one day extra each Leap-Year—why, therefore, need anyone object to put the odd day extra in its natural place within the last week of the year, when Christmas week is generally so broken and might thereby be mended to universal advantage?

We all know how the days of Christmas week seem to be mixed up in the average person's mind when Christmas Day falls near the middle of the week, as was the case last year, when Christmas Day fell on Wednesday, and will be again this year when it falls on Thursday. How common then will be the query, "What day of the week is this?" and the remark, "I've quite mixed up the days of this week,"—due to the ordinary weekly routine being upset.

Again, Christmas week in the great majority of homes is the most expensive week in all the year, and with the wage-earning classes is followed by the least wage on the next pay-day (with consequent privation), owing to only part of the week being worked—hence my method of adding an extra day to Christmas week would more equitably adjust the week's wages for poor people by giving them one extra day's pay six days earlier than at present, to make up for what is now their shortest week, and so meet their difficulty.—

The exceptional cases of standing weekly wage people, such as foremen, etc., could be easily met by adding to that week's pay, one-sixth for the extra day.

Further, great public convenience would result from this simple Christmas Day adjustment. The working of Railways on Christmas Day (then always following Sunday) would be much simplified and result in considerable economy, as Christmas Day's work would run smoothly with Sunday working.

All who have to deal with Shipping, etc., have experienced the difficulty and loss occasioned by Christmas Day falling near the middle of the week and consequently upsetting regular sailing days, etc.

Almost all other branches of business are similarly inconvenienced, to the disadvantage of everybody, hence I submit that great public convenience—far beyond what is at first sight apparent—would result from this mere adjustment of Christmas-week.

Undoubtedly, next to the inevitable day, *the week is now the universal and essential unit of time in Civil life* which should regulate the periods of the Calendar. Every new year this is emphasized by the increasing number of almanacs, diaries, tablets, etc., arranged in week-day order, *because nearly all our arrangements, such as wages, weekly purchase of food, appointments, etc., are based upon the week which is within the mental grasp of everybody.*

Since *the week* cannot (except in February) be a true measure of the *present months*, I would discard them, because greater benefits would result from dividing the 52 weeks of the year into 13 months of 4 weeks each. We have 13 weeks per quarter-year, why not 13 months per year, and so secure equal Quarters and Quarter-days too?—as may be seen from the brackets and numbers on the sides of the comparative Calendars on page 7.

It will be noticed that the "Proposed Calendar" is based upon *the week* as the chief factor, *with months of 4 weeks*, so arranged that the days of each month are *fixed* alike in their monthly dates and week-days. Sunday *fixed* as the 1st day of the week would always be the 1st of the month, with the 8th, 15th, and 22nd dates for the 3 following Sundays. Mondays would be *fixed* on the 2nd, 9th, 16th, and 23rd, with Tuesdays, etc., in the same clear order.

The first point to determine in the construction of a Calendar under the present style is to connect the week with the year, to find the days of the week applicable to the days for any year of the era. All such trouble would be avoided for all future time if this Rational Almanac method of keeping Christmas Day *apart from the week-day names* is adopted.

This "First Step's" chief advantage would be the great convenience of keeping the days of the week for the dates in every year alike, so that (*even without disturbing the months, as suggested above*) we could have the week-days of the same month each year the same for reliable comparison of earnings, expenses, etc.

There would be but little appreciable difficulty in transposing the dates from the changing present to the proposed *fixed* style, as that could be easily done by the *Combined Calendar* arranged monthly, as shown before the Introduction, though that would hardly be needed after the first year. Anniversaries, birthdays, etc., could thereby be adjusted to always fall on the same date as well as on the same day of the week in future years, —*e.g.*, The King's Birthday would always fall on Thursday, and so be celebrated on that day to the convenience of all concerned, instead of, as so frequently happens, it being postponed by Army Orders, etc., to a more suitable date when the 9th of November falls on Sunday, as it did this year, when also Lord Mayors' Day could not be celebrated, nor the Lord Mayors, Mayors and Sheriffs take office till the following day.

Similarly, inconveniences would be removed for other celebrations, such as Martinmas (Nov. 23rd), which also fell on Sunday in 1902.

Leap-year Day would have to be provided for to secure such desired uniformity, and, like Christmas Day, I would "let it leap" the week-day name and call it "Leap Day," thus treating it as the extra day it really is. It has only been tacked on to February because that month had been unduly robbed by Augustus and other Cæsars, hence beyond usage there is no reason why it should be placed there. A more ideal location for it would be to let it complete the equalization of both half-years on June 30th, when the weather is fine, and the day might be utilized as a general Mid-Summer holiday, midway between Whitsuntide and August Monday. Placed there it would, by my plan, always fall as an extra Saturday, and thus secure the week-end holiday advantage, enabling the toilers to get 2½ days' holiday from Saturday noon over "Leap Day" and Sunday to Monday.

Or Peace Day (July 29th), marking the establishment of the Hague Court of International Arbitration would as Leap Day in the proposed Calendar duplicate Saturday and be a suitable Leap Day Holiday upon which all nations might literally "leap for joy," and unite to celebrate and promote the blessings of Peace.

An alternative position is to place "Leap Day" next to "Lady Day," the end of March, as designed by Julius Cæsar, to make it complete the Roman Solar Year. That would have the advantage of giving an extra day's grace to persons then removing their goods and chattels to new homes, but the Equinoxial weather is then too rough for outdoor holidays.

If, however, the public desire to retain it in the position of February 29th, then we might regard it as an extra Wednesday in Leap Year, to retain the yearly weekdays undisturbed.

I submit that in common fairness "Leap Day" ought to be a holiday to yearly servants, as if they work that day they get nothing for it. Since it only comes once in 4 years the advancing people might fairly make it a holiday.

Our SECOND STEP.

LET MOVABLE FEASTS be FIXED and ARRANGED to SUIT the PRACTICAL CONVENIENCE of HUMANITY.

We have fixed Anniversaries for such purposes as Public Fairs, Town and Village Feasts, Galas, Agricultural Shows, etc., therefore why not *fixed dates for Festivals*, such as Easter, etc., when the benefits of fixed Chritmas, etc., are so apparent, and the anomalies of drifting Festival Dates are so evident when tabulated?

RANGE of CHANGEABLE DATES altering EASTER, WHITSUNTIDE and other MOVABLE FESTIVALS.

Results of the present changeable system, taking for example Easter and Whitsuntide (7 weeks later) as typical of the others:—

Range of Changeable Dates within which Easter falls.	Year.	Easter Day.	Whitsuntide	Days between consecutive Yearly Festivals.
Mar. 22				
,, 23				
,, 24	**1900**	April 15	June 3	
,, 25	**1901**	,, 7	May 26	8 off
,, 26	**1902**	Mar. 30	,, 18	8 off
,, 27	**1903**	April 12	,, 31	**13 on**
,, 28	**1904**	,, 3	,, 22	9 off
,, 29	**1905**	,, 23	June 11	**20 on**
,, 30	**1906**	,, 15	,, 3	8 off
,, 31	**1907**	Mar. 31	May 19	15 off
April 1	**1908**	April 19	June 7	**19 on**
,, 2	**1909**	,, 11	May 30	8 off
,, 3	**1910**	Mar. 27	,, 15	15 off
,, 4	**1911**	April 16	June 4	**20 on**
,, 5	**1912**	,, 7	May 26	9 off
,, 6	**1913**	Mar. 23	,, 11	15 off
,, 7	**1914**	April 12	,, 31	**20 on**
,, 8 Mean date.	**1915**	,, 4	,, 23	8 off
,, 9	**1916**	,, 23	June 11	**19 on**
,, 10	**1917**	,, 8	May 27	15 off
,, 11	**1918**	Mar 31	,, 19	8 off
,, 12	**1919**	April 20	June 8	**20 on**
,, 13	**1920**	,, 4	May 23	16 off
,, 14	**1921**	Mar. 27	,, 15	8 off
,, 15	**1922**	April 16	June 4	**20 on**
,, 16	**1923**	,, 1	May 20	15 off
,, 17	**1924**	,, 20	June 8	**19 on**
,, 18	**1925**	,, 12	May 31	8 off
,, 19	**1926**	,, 4	,, 23	8 off
,, 20	**1927**	,, 17	June 5	**13 on**
,, 21	**1928**	,, 8	May 27	9 off
,, 22	**1929**	Mar. 31	,, 19	8 off
,, 23	**1930**	April 20	June 8	**20 on**
,, 24				
,, 25				

Early 17 days. Late 17 days.

Why should these Festivals leap forward 19 or 20 days (3 weeks) on the Calendar *about every third Year*, and flounder along this 35 days range through the full Moon's wanderings after the fixed Equinox? There is no sound reason for this absurdity which makes all these recurring Festivals untimely and unreal.

Whilst we may deferentially admit that early Christians may reverently have held the early and misleading primitive Calendar illusion, that the Festival dates should be placed in the Almanac of the Sun's course by blending the Moon's records therein, the universal use of Almanacs now proves that course to be inconsistent with common sense convenience.

The tendency is already strong to fix most local holidays on the 1st, 2nd, 3rd, or 4th Monday, or other week-day in the particular month. To secure the fullest advantage from the proposed new arrangement of the Civil Year, we should have all FESTIVALS, HOLIDAYS, etc., FIXED *on the same dates for future years*, and as the end of the year 1916 (Christmas Day) seems to be the most opportune time that we shall have for many

generations to come for making such change, I would suggest *that future Festivals and Holidays* be *fixed* on the same dates as in that year. Then the change would come naturally and with the least possible disturbance.

It is extremely difficult for the average mind to discern that *any* practical advantage can result to the community from our chief Festivals being subject to the variations of the moon from Christmas. This primeval method may have served to mystify the serfs and vassals of the Middle and Earlier Ages, but I cannot see how it can be for the public convenience that Easter should fluctuate between March 21st and April 25th, and Whitsuntide between May 9th and June 13th.—On the contrary, these variations cause much inconvenience to the public by unhinging their ideas of the progress of the Seasons, and throwing Easter Holidays too early, when the people cannot enjoy them in March weather, as experienced in 1902 and expected in 1904–7–10, etc.

It has been interesting to trace how this absurd dislocation arose to confuse the year. Evidently the intention was to mark the Vernal Equinox, which in those pre-Almanac times had been the basis of Pyramid Astronomy and was of such public importance; whereas now it is best to leave the official Astronomers to record that precise time without varying Easter

In the year A.D. 325 the Roman Church at the "Council of Nice" decided that *Easter* (which had been most unreasonably varied to suit the selfish convenience of those in power, and the confusion of the people) should thenceforward "be celebrated *on the Sunday which "follows the full moon that happens on, or "next after, the day of the Vernal Equinox*" (then on "Lady Day," March 25th). Should the 14th day of the moon, which is regarded as the "full moon," happen on a Sunday, "*Easter Sunday* is *deferred* to the "following Sunday—*to avoid concurrence with "the Jews and other heretics.*"

It may be that the Reverend Pope, with the Cardinals, etc., in full Council, then graciously, in the interest of peace and goodwill, refrained from clashing with the Jewish or truer Easter anniversary, to avoid embittering religious feeling then greatly strained, and probably that concession was wise. *But my point is* that if the then recognised authorities of by far the then greatest Church in Christendom, in solemn assembly, for the definite purpose of fixing the Calendar and so determining the date upon which Easter should be celebrated, then *deliberately* provided that it should be put off, if the Jews and other heretics were holding their anniversary on the true date, then there seems no valid reason, even from a Church point of view, why Easter should not be *fixed* to recur at a date as nearly approximating to the average Easter-time as may be found desirable, for we may fairly emphasize the fact that *the higher Hierarchy did not make a vital* point of keeping Easter on

the exact anniversary of the revered Christ's Death, which indeed they did not know.

It will probably be admitted that the Reverend Fathers at Nice under-estimated the practical difficulties in applying their regulation to the Calendar, and hardly gave sufficient consideration to the equitable subdivisions of the year for the everyday use of the people. Moreover, their fixing of the "Pascal Full Moons" to determine Easter is not always truly observed, and can only be regarded in view of the lapse of odd days and the removal of the Equinoxial time from the 25th to the 21st March as a very rough approximation to the anniversary of the Death of the Prince of Peace. That being so, *what rational objection* can even the Churches raise *to the permanent fixing* of these Festivals? Rather would I ask them, what effort will they make to further meet the needs and convenience of all Christians of whatever creed, by having these Festivals *fixed?*

In those early days when Christianity was struggling into existence, it may have been wise to arrange for the Festivals to be celebrated about the traditional holiday times handed down by Pagan ancestors. Then Christians numbered such a small minority that the Papacy discreetly provided that Christian processions should not risk encounter with the processions of "Heretics," for similar reasons to those which still cause the Irish Police to prevent the processions of Catholics and Orangemen from clashing, as such collision would inflame passions and result in bloodshed.

But now that public policy guarantees religious liberty to all creeds, and nearly all the civilized world celebrates Easter on the same date, whilst it is quite certain that such moving date does not truly register the date of Christ's death, there no longer remains any adequate reason for inconveniencing ourselves by constant changes of Easter.

We know that the erratic changes of Easter, etc., mystify and delude some foolish people; but all who impartially consider the facts must come to the conclusion that no such subterfuge can enable to us fix upon the Anniversary of Christ's crucifixion. The Moon-date fixing of Easter only gives an approximation, which would be far better applied if permanently fixed upon the most convenient date for the convenience of the People as well as the Church.

We have so long been accustomed to the anomalies and inconveniences caused by the old senseless shifting of Festivals, that the pleasures of the Holidays attached to such Festivals have claimed our attention till we have lost sight of the fact that both the Festivals and Holidays are depreciated by their changing uncertainties, which, if removed, by simply fixing Easter, like Christmas, would abolish the numerous inconveniences now caused by movable Easters, and in return bring us far greater facilities and more suitable conditions for the full enjoyment of, not only

Easter, but the Whitsuntide, etc., Festivals, which were intended to brighten and exalt the lives of all people.

As these movable dates were designed for the benefit of the Christian Churches we naturally expect to find that some tangible benefits have accrued therefrom, but I quite fail to see any real Church advantage thereby derived. Where does it gain in different years by having variations of from 1 to 6 Sundays or weeks after Epiphany, or from 22 to 27 Sundays after Trinity, when only 25 of the latter are provided for in the Prayer Book, causing Churchpeople, in years when Easter is early, to revert back and use up part of the Epiphany Services for the 26th and 27th Sundays after Trinity? These services would be equally well brought before the congregations in their variety throughout the year by taking the Sunday services consecutively as printed in the Prayer Book. Some persons think the Church gains a desirable variation in the Psalms through the irregular (12) months, but when we remember that only 30 days are provided for, and that the 7 months containing 31 days cause the 30th day Psalms to be read 18 times a year as against the rest 12 times, that variation is clearly seen to be unwise. I submit that, even without altering the Prayer Book, a far more regular rendering of the Psalms would be practicable for Sunday services than hitherto, if my plan of 13 months of 28 days were applied :—

e.g. – Let the total digits of each month in turn be taken to determine the Psalms to be read for the 1st Sunday in the month, and let 7 days be added successively thereto for the following Sundays of the month, thus :—

No. of Month.	Sundays of Month.			
	1st.	2nd.	3rd.	4th.
1 ...	1	8	15	22
2 ...	2	9	16	23
3 ...	3	10	17	24
4 ...	4	11	18	25
5 ...	5	12	19	26
6 ...	6	13	20	27
7 ...	7	14	21	28
8 ...	8	15	22	29
9 ...	9	16	23	30
10 = 1	1	8	15	22
11 = 2	2	9	16	23
12 = 3	3	10	17	24
13 = 4	4	11	18	25

Read Psalms for these days as now printed, and so avoid the repetition of the 1st, 8th, 15th, and 22nd days' Psalms only on Sundays.

The above scheme shows only 16 sets of Psalms would be repeated twice, and 20 but once ; whereas this year 12 sets will be sung once, 13 sets will repeat twice, and *5 sets* (5, 12, 19, 26 and 31) will be sung *thrice* on Sunday. Further, as the 30th Psalms are also read for the 31st, the latter are repeated 18 times a year in daily services.

The present make-shift arrangement for Collections, etc., on the 1st Sunday in each month, involves 5 weeks intervening during 4 months in the year, whereas those churches might gain 8⅓ % more through their collections by adopting the 13 months' year.

Even this change of Psalm dates would only affect the English Established Church, as the Roman Catholic Church (comprising nearly 100,000,000 people of various nationalities) and other Christian churches, do not have fixed Psalms for the days of the month. But surely the Established Church might overcome this small difficulty for the public good, and thereby refute the charge which has so often been made "that the Church, Clergy and Bishops have nearly always retarded reform and the progress of the people."

As one brought up under the influence of the Established Church I feel convinced that the Church would decidedly gain by being less rigid in its conservatism and by helping forward such a change: for the fixing of Christmas Day (as a duplicate Sunday) to always follow Sunday should tend to retard rowdyism and promote a more extended Christian observance of that Festival; whilst the *fixing* of Easter (on which the other Festivals depend) should also tend towards its more general observance.

As the existing absurd system of changing the Festival dates makes it impossible for Feasts to fall on the exact anniversary dates they are supposed to represent, why should we longer hesitate to meet the needed public convenience when that should be our first consideration? The Church exists for the people and not the people for the Church.

I therefore hope that the leaders of the Churches, from His Eminence the Pope, Archbishops, Bishops of all creeds, etc., down to their members, may favourably consider this question of sub-dividing the Civil year for the best convenience of the people for whom the Church exists.

His Eminence the Pope, who, with the great Roman Catholic Hierarchy through its unique international position governs the oldest and largest section of the Christian Church, might wisely initiate the 13th month herein later suggested, and complete the reformation of the Calendar for all future time as a standing memorial to the late illustrious Pope Leo XIII., and thereby confer a blessed convenience throughout the World. That would be particularly appropriate, as the two great Pontiffs whose titles each numbered XIII., would thereby be coupled together, as it was Pope Gregory XIII. who brought the highest honour and glory to the Papacy by carrying through the last great Reform of the Almanac in 1582.

The fact that Constantine the Great, the first Christian Emperor, who established Christianity under the Roman Government, was of mixed Roman and British origin, and was raised to be Emperor at York, from which city these suggestions are humbly made, may appropriately be remembered, as York long enjoyed, jointly with Rome, the honor of being the centre from which the *great Cæsars who decided the lengths of our present months*, ruled the vast Roman Empire.

Moreover, Constantine the Great really established the Catholic Church by calling and presiding over the celebrated Council of Nice, which, after constructing the Creed, etc., unfortunately continued the moon-wandering date for Easter. That may have been politic then, but we may be sure that if Constantine the Great could have foreseen the useless waste and confusion which changing Easter dates inflict upon the people of our time, he would have advocated a fixed Easter date like Christmas.

The Catholic Church would do well to complete the great work of Almanac Reform for the public good in memory of these great men, especially of Constantine, who co-ordinated and established the high principles of Christianity, and first endowed it with that royal and governmental power throughout the vast Roman Empire (then covering Europe and large parts of Asia and Africa) which enabled it to become the strongest social and political power which has ever influenced for good the highest aspirations and destinies of mankind.

The Papal authorities have always held the prerogative of fixing the Calendar, therefore they could best take the initiative of counselling the nations to accept the reform. On the whole, they have acted wisely in the past, and it is sincerely hoped that they may seize upon the present excellent opportunity to carry out such an Almanac reform as will exalt the honour of the Church by applying its precepts of thus "doing good to all men," who could thus be relieved of Almanac troubles and their many contingent inconveniences.

The proposed change, if accepted by the combined Churches, would tend to unite the Christian Communities into a more brotherly regard for each other, and strengthen all for the great work of raising mankind to higher ideals of life and thought. The Churches do not realize how far present diverse Almanac dates for Festivals retard their efforts in Foreign Missions, but a Christmas spent in Jerusalem, where the religious sects celebrate within one year three Christmases and five New Years, would reveal to the leaders of our Churches the desirability of uniform Almanacs to remove the jealousy and animosity which the present diverse celebrations engender to the restriction of religious progress, as for instance when the Russian Greek Church celebrates its Christmas thirteen days after the Catholic and Protestant sections of the Christian Church.

I hope that they will recognise that these Almanac proposals are put forward solely to facilitate the general convenience of humanity, and thereby save much constant trouble, worry, annoyance, and energy now wasted by our senselessly shifting the weekday names and positions of the Festivals.

There is no desire to do away with the Festivals, but rather to increase those holidays and their value by fixing them rationally at periods best calculated to serve the interests of

the vast masses of the workers, and for public convenience. There would be neither deprivation nor loss by the change, for all would gain thereby. We realize the public benefit of a fixed Christmas. Why should we not benefit still more by fixed Easters, etc.?

The change would maintain and enhance the value of all that is best in the Calendar. Anniversaries, birthdays, etc., could then be more easily kept than now.

We all indirectly realize the advantage of Christmas being fixed on December 25th, and it requires but slight thought to convince any reasoning mind that a distinct blessing would be conferred upon our toiling masses, if the fixity of Christmas could be permanently blended with the week-end extra advantages, as experienced in 1899. Then we could always secure the best possible time conditions for giving the toilers the maximum holiday privileges in unbroken time consistent with public convenience,—for business of nearly all kinds could easily cease from Saturday till Wednesday (Sunday, Christmas Day, and Bank Holiday (Boxing Day), three clear days) instead of Christmas, as now, nearly always splitting the week into irritating parts, and crippling the ideal holidays, which, when so senselessly split up, are almost useless to those who are too far away from their friends to make it worth their while to incur the expense of railway, etc., journeys for such limited times.

The Sunday thus proposed as Christmas Eve could then most appropriately be used as "Peace Sunday" by all Churches to promulgate the Principles of Peace and Arbitration, as the Rev. Dr. Cobb, of London, suggests.

Practically, everybody would benefit by the public convenience which would result from the full holiday and short week-end rest being taken together, as could easily be secured if we simply decide that Christmas Day shall be recognised as the "Year-day" apart from any week-day name, and that the following day shall always be called Monday.

When we consider that the greatest and widest-reaching reform of thought which has ever benefited humanity, originated in the birth of Christianity on the Christmas Day from which the Christian Era is dated, and know that the dating back of Time to that period furnishes the strongest evidence of the Christian land-mark in the world's History, whilst it is the most convincing and indelible "Time-mark" which forces home to us the fact that then began the great change for the better in the spirit of mankind; we can safely say that the setting apart of Christmas Day, as above all ordinary day-names, would be the most appropriate method of marking progress during this 20th Century; therefore the best possible Almanac which experienced men can design should be applied to progressively help forward public and international convenience.

HISTORY of the CALENDAR and ALMANAC.

Before explaining my proposals for equalising the months to 28 days (4 weeks) each, by introducing a 13th month between June and July, it seems advisable to here briefly record the History of the Almanac, especially of that part which discloses the petty causes which led the Roman Cæsars to unwittingly inflict our present uneven months upon mankind, during nearly 2,000 years, to the confusion and inconvenience of the people. Then we shall the better be able to decide whether these traditional encumbrances should longer be allowed to impede our progress, or whether we should seriously seek to overcome these old anomalies, and give full almanac facilities to our own and future generations.

In the earliest times primitive men could only count time by the Moon's cycles measured in Days, which, by numbering 29·53 each, gradually led to the use of the 30 days' month, which (as per pink page 8) was used in the time of Noah, when civilisation had advanced from counting single Moon cycles as "Years" to counting 10 Moons or Months to their "Years," as did also the Ancient Arabs and Romans in the well-authenticated time of Romulus, the founder of Rome.

The Egyptians seem to have first discovered the true length of the year by studying Pyramid Shadows, as shown on the pyramid pages hereof. By rationally instituting equal months of 30 days each, they appear to have used much better common-sense, and studied the convenience of their people far more than did the Roman originators of our erratic Almanac.

The Ancient Egyptians divided their year of 365 days into 12 months of 30 days with 5 extra days at the year end, and as they failed to adjust the extra ¼ day per year, their seasons gradually drifted over their Calendar till in the Sothic period of 1,460 years (365 × 4) they had recorded 1,461 vague years—a vague year of 365 days in excess. Their New Year's Day had thus successively been held on every day date in our year. That system kept the common people ignorant of the true *year's length*, then carefully kept secret by the pyramid priests, who knew that their power over the people depended upon that secret knowledge by which they could notify the Seasons to the benefit of their people and thus appear to hold communication with their great Sun-God "Ra" who was declared as governing the Seasons through the priests.

The Ancient Greeks derived their Calendar from the Egyptians with whom they traded. Their year of 354 days was divided into twelve lunar months fixed on the Actual Changes of the Moon;—full moon being the middle of the month—so some months had 29, but more had 30 days. That being 11¼ days short of the Solar Year they interpolated an intercalary month of 29 or 30 days every other year to adjust the Civil to the Solar

Year. But as this made the interpolated year about 7¼ days too long, the extra month was from time to time omitted to rectify the error. Instead of using our week of 7 days, their months were sub-divided into 10 day periods.

The week (regarded as the 1st unit derived from a grouping of days) was varied greatly in ancient times.

The Ancient Mexicans had a week of 13 days, which was the nearest to practically dividing the year. The Ancient Egyptians had a decade of 10 days—subsequently reduced to 7 days—whilst the Romans gradually reduced their sub-divisions of the month from 10 to 8, and finally to the seven days we now use.

The thought is here forced upon the mind, —why is it that notwithstanding the many and varied inventions of machinery, scientific discoveries applied to manufactures, the great progress made in Agriculture, Fertilization and Irrigation, etc., together with the vast strides made in our means of transit by Railways, Steamers, etc., which have so enormously increased our means of production and distribution,—that mankind have not been able to further reduce their week and extend their leisure? Why is it that in contrast with the rest of creation mankind have still to toil through the 7 days week fixed for the conditions of nearly 2,000 years ago? Does it appear unreasonable to ask whether, if all these inventions, with all that make for progress, had been rightly applied to enhance the welfare of the people instead of the few privileged individuals, would it not have been possible to reduce the week to 5 days (which would have exactly divided the 365-days' year), four of which being working days, would have given the day as an exact quarter of the week — who would object? The Clergy? Certainly not, provided they got $\frac{\text{Stipend} \times 73}{52} = 40\,\%$ increase upon their present incomes, and their parishioners led quieter, happier lives.

Probably the gradual evolution of events will lead to the Saturday becoming a weekly holiday conjoined with Sunday, leaving 5 working days, which, when naturally worked in half-days, will perfectly harmonise with the metric system. The workers paid, say, 5 dollars, francs, marks or shillings per week, would earn exactly 50 cents per shift, or if 5·60 per week, then 56 cents per shift, and so on to higher rates. That seems to be the ideal week to which the Labouring Classes should seek to attain in order to provide work for the unemployed, who should be compelled to do their share.

We have at the present time to deal with the week of 7 days as now constituted, which, fortunately, is very nearly a 52nd part of the year. It is noteworthy that the week of 7 days, as universally adopted over both the Christian and Mahomedan world seems obviously derived from the moon's phases as the fourth part of the Lunar month, and that the 7-days' week

was also the recognised week in the Ancient Brahmanical Astronomy. All these seem to have named their days from the 7 prominent heavenly bodies—Sun, Moon, Mercury, Venus, Mars, Jupiter, and Saturn.

HERE IT MAY BE INTERESTING TO NOTE THE HISTORY OF THE 12 MONTHS' DEVELOPMENT.

The Civil Calendar of 12 uneven months now in use practically throughout European, American, and Australasian countries, as well as part of Asia and Africa, was adopted from the Romans.

Our knowledge as to how the varying number of days in the months arose is rather meagre, but we can go back to the time of Romulus,—long previous to the Reformation of the Calendar by Julius Cæsar as we find commemorated by the establishment of the present Julian Era on 1st January, 45 B.C.

Prior to Julius Cæsar's time it appears that Romulus (the founder of Rome), about the year 738 B.C., divided an assumed year of 304 days into 10 months, beginning with March, hence our months' names, September (7th), October (8th), November (9th), and December (10th). July was called Quintilis (5th), and August Sextilis (6th) until altered in compliment to Julius Cæsar and Augustus.

It is worthy of note that the Revised 10 months' Roman Year began *at the Spring Equinox*, which was the critical time for testing the Year's length by Pyramid shadows.

It is significant that this was about the time that the exclusive Egyptian barriers were being broken down and Egyptian-acquired knowledge began to be filtered into Europe through the Greeks trading with Alexandria, from whom possibly Romulus had heard of the advantages of a longer "Year" unit of Time.———Before that, still shorter periods of 5 and 6 months respectively appear, from the Bible Ages, to have been termed "years," as explained in the Bible Ages Section.

The Roman *Year*, instituted by Romulus about 738 B.C., *had only 304 days*, divided into 10 months; *i.e.*, 61 days less than the Solar Year, hence its commencement did not correspond with any fixed Season, though the Seasons in Italy are more marked than in Egypt. Numa was led, after 25 years' study of these "Yearly" lists of days, to add two extra months to the "*Year*," which was thus roughly brought to accord with the Seasons in 713 B.C.

The 304 days' "Year" begun by Romulus about 738 B.C. marked a great stride in the development of the Year in Southern Europe, and indicates that they had used a shorter Year before, though the evidences of the Great Pyramid and Silbury Hill (see Appendix) point with certainty to the fact that the pyramid-building Egyptians were long before able to fix upon a period much nearer the length of the Solar Year, whilst probably the

cone-building and vertical stone erecting Druids had also found the length of the Year within a day or two.

When Numa's two additional months were added, about 713 B.C., January was placed before March, whilst February was put after December. In 452 B.C. the Decemvirs altered February to its present position. Then the months had alternately 29 and 30 days to accord with the revolutions of the moon, hence their year had 354 days, *but later, as odd numbers were considered more fortunate*, another extra day was added to make 355 days, which being still 10¼ days short of the Solar year, a few days extra were inserted by proclamation at varying intervals, to keep pace with the Seasons. Numa later ordered the insertion of another (13th) month of alternately 22 and 23 days, to fall every alternate year, between the 23rd and 24th February. By that means each 4 years showed an average of 366¼ days. Next it was ordered that every 3rd period of 8 years should only have 3 of these extra months of 22 days each, to reduce the average to 365¼ days.

The length of this extra (13th) month, to adjust the Civil to the Solar year, was subsequently left discretionary with the Pontiffs, who afterwards arranged and directed the Calendar in secret.

In Rome the knowledge of the Calendar and the dates of Feasts, etc., were for a long period *kept secret*, but about 304 B.C. a list was publicly exhibited by Flavius, who had secretly secured it.

The Pontifical power of variation was soon abused for political purposes, as by giving more or less days to a month the terms of magisterial and other offices (with their perquisites) were altered to bring the annual elections to suit the party in power.

This went on till Julius Cæsar's time, when the difference between the Civil and Solar year had accumulated to 3 months, so that Winter appeared in the Almanac's Autumn, Autumn in Summer, etc., the Almanac being altogether out of gear with the Seasons.

Julius Cæsar's arrangement gave an alternation of months of 30 with those of 31 days, as outlined below, where the small figures over the last 10 months respectively indicate the numbers of the months in the 10 months' year, which the early Romans and Arabs used in primitive times, when each of their crude Almanac dates in turn drifted through all the Seasons of the Year until Numa's Reform.

Roman Month Nos.	1	3	5	7	9
	Jan.	Mar.	May	July	Sept.	Nov.
	31	31	31	31	31	31

Roman Month Nos. ...	2	4	6	8	10
	Feb.	Apl.	June	Aug.	Oct.	Dec.
	30	30	30	30	30	30

August—then named Sextilis'(6th)—was one of 30 days; but when Augustus in later years gave it his name, he could not endure that it should be shorter than Julius Cæsar's month (July), and therefore gave it an additional day at the expense of February. Subsequently objection was raised to the 3 consecutive months, July, August, and September having 31 days each, which made the 3rd three months of their year 93 days compared with but 90 days in the 1st three months. That disturbed the computation of Interest, etc., so Augustus, to sustain his pride and avoid publicly acknowledging the higher merits of Julius Cæsar's excellent and simple plan, elected to deduct one day each from September and November to make the 31st October and 31st December—hence we see that the lengths of the months were partly fixed by the caprice of Roman Emperors, and not wholly, as they should have been, for public convenience. That is how the present style became so disproportionately erratic and needlessly difficult to remember.—It seems clear that the month was the difficulty through which the old framers of the Almanac failed to make it complete.

Julius Cæsar decided to restore the Spring Equinox to the 25th March, as Numa had formerly done, for which purpose the year 46 B.C. (called the year of confusion) was extended to 445 days. His plan was to adjust the period between New Year's Day and the old Equinox (25th March, "Lady Day") by adding a Leap Year Day every 4th year between the 24th and 25th March to record the Spring Equinox right. There it is still inserted in the Catholic Ecclesiastical Calendars.

The fractional error (beyond Leap Day in every 4 years) amounts to a day in 128 years,* therefore when the Reformation of the Calendar was made by Pope Gregory XIII. in 1582, the Equinox had retrograded on the Calendar to March 11th. In order to restore the Equinoxial position, Pope Gregory XIII., knowing, through astronomical research, that March 21st was the truer date for the Spring Equinox (which had been mistakenly fixed in the old Calendar as March 25th by the Council of Nice in the year 325 A.D.), directed that 10 days were to be suppressed (5th October to be called 15th), as well as the Leap Year Days on all centenary years except those which are multiples of 400.

There still remains a small difference which will amount to a day in 3,323 years, to meet which the Gregorian rule applies to the year 4,000 (and its multiples) when they come, so we may fairly rest content as to these Calendar adjustments being sufficiently accurate when the "*key of the year*" (Spring Equinox) cannot now vary more than a day in 20,000 years.

* NOTE.—This 128 years' cycle, as per Pyramid page 79, probably misled the advisers of Julius Cæsar who missed the 128th year day when the sun shone sheer down the Pyramids' Equinoxial slope and cast no shadow.

SEPTEMBER hath XIX Days, this Year. 1752.

D	D	Fasts and Festivals.	D pl.	D's Signs.	D rises	D sets	Aspects and Weather.
1	f	Giles ab. & Co	10	*secrets*	4	8 A. 39	
2	g	London burnt	11	*bleed.*	5	9	Pleasant

According to an Act of Parliament past'd in the 24th Year of his Majesty's Reign and in the Year of our Lord 1751, the Old Style ceases here, and the New takes place; and consequently the next Day, which in the Old Account was to have been the 3d, is now to be called the 14th; so that all the intermediate Nominal Days, from the 2d to the 14th are omitted, or rather annihilated this Year, and the Month contains no more than 19 Days, as the Title at the Head expresses.

14	e	Holy Cross D	22	*thighs*	6	9	47	Seasonable
15	f	Sun East 6 11.	23	*hips*	7	10	31	Weather.
16	g		24	*knees*	8	11	23	
17	A	5 S. aft. Trin.	25	and	9	12	19	
18	b	Sun West 5 52	26	*hams*	10	Morn.		Thunder and
19	c		27	*legs*	11	1	22	☌☉☌
20	d	Ember Week.	28	*ancles*	12	2	24	hasty
21	e	St. Matthew.	29	*feet*	13	3	3	☌☉☿♀☌♀☿
22	f	Day dec 4 23	♎	*toes*	14	☽ rises.		Showers.
23	g	☽ equal D & N	1	*head*	F	6 A. 13		
24	A	10 S. aft. Trin	2	and	16	6	37	High Winds.
25	b		3	*face*	17	7	7	☌☉☿□☿☌
26	c	St. Cyprian.	4	*neck*	18	7	39	
27	d		4	*throat*	19	8	18	☌☌☿
28	e	Day 11 h. 40 m.	5	*arms*	20	9	3	
29	f	St. Michael.	6	*should.*	21	9	59	Rain.
30	g	St. Jerom.	7	*breast*	22	11	2	

The Dominion of the Moon in Man's Body. Passing under the Twelve Zodiacal CONSTELLATIONS.

♈	*Aries* Head and Face.	♎	*Libra* Reins and Loins.
♉	*Taurus* Neck and Throat.	♏	*Scorpio* Secret Members.
♊	*Gemini* Arms and Should.	♐	*Sagittary* Thighs & Hips.
♋	*Cancer* Breast and Stom.	♑	*Capricorn* Knees & Hams.
♌	*Leo* Heart and Back.	♒	*Aquarius* Legs & Ancles.
♍	*Virgo* Bowels and Belly.	♓	*Pisces* Feet and Toes.

Moon. SEPTEMBER, 1752.

The 15 day at 5 morn. Saturn } is with the Moon.
The 30 day at midnight, Jupiter }

☽ ☍	☽ ☌	Sun rises.	Sun sets.	Moon's South.		Observations.
1	12	5 39	6 21	5	A. 37	
2	13	5 41	6 19	4	26	It is to be obſerv'd, That the
14		5 43	6 17	5	15	ſeveral Feaſt Days, on which the
15		5 45	6 15	6	3	Firſt Quart. 1 day, at 1 after.
16		5 47	6 13	6	51	Payments of Rents Annuities &c.
17		5 49	6 11	7	37	depend, and alſo the Opening of
18		5 51	6 9	8	26	Common Fields or Paſtures, are,
19		5 53	6 7	9	12	by the Calendar eſtabliſh'd by the
20		5 56	6 4	9	58	late Act of Parliament, fix'd up-
21		5 59	6 1	10	43	on the ſame Nominal Days of the
22		6 0	6 0	11	28	reſpective Months as before in the
23		6 2	5 58	Morn.		Full Moon 23 day, at 1 after.
24		6 4	5 56	0	16	Julian Account they were placed;
25		6 6	5 54	1	5	yet the Act provides and directs,
26		6 8	5 52	1	57	That the Payments of Rents, An-
27		6 10	5 50	2	51	nuities, &c or the Opening or
28		6 12	5 48	3	47	Shutting of Paſtures, ſhall not by
29		6 14	5 46	4	44	this means be accelerated or for-
30		6 15	5 45	5	41	Laſt Quart. 30 day, at 2 after.

warded; but that the Days of Payment, or Right of Opening or Inclosing of Commons, formerly depending on the said Feasts, are to be kept and obſerv'd on the ſame Natural Days of the Year on which the ſaid Feaſts would have fallen, if this Act had not been made: for this Reaſon the 10th of October, is called Old Michaelmas Day, *and the 22d of* November Old Martinmas Day, *and ſo of the reſt, as being the reſpective Days on which ſuch Rents or Payments become due, and on which ſuch Rights of Commons, &c take place, and not before.*

N. B. *That all Dates of Births, Deaths, or other remarkable Events, in the Regal, or Chronological Tables, prior to, or upon the 2d of* September, 1752, *are to be underſtood according to the Julian Account, or Old Style*

The LAST BRITISH REFORM of the ALMANAC consequent upon Pope Gregory XIIIth's wise Reform of 1582.

Reproduced from the ALMANAC for 1752, showing how the 11 DAYS were then left out, and the dates changed from Old Style to New Style.—*Note.*—A, b, c, d, e, f, g, then indicating Sunday and week-day names.

Pope Gregory XIIIth's amendment of the Calendar was stoutly resisted by most of the Protestant parts of Europe for more than a century, as they regarded it as a papistical invention, but inevitably the advantage *told* in time, and eventually all the civilized nations (except the Greek Church, including Russia) voluntarily adopted the Gregorian style, and so recognised that the Roman Church had taken a wise step in the interests of mankind.

It was adopted in England by Act of Parliament dated 1751, which provided that the error of 11 days should be corrected by the 3rd of September, 1752, being regarded as the 14th September, as shown on the 1752 Almanac here reproduced. This gave rise to the out-cry, "Give us back our 11 days," raised by some ignorant labourers who thought they were losing 11 days of that year in computing their ages.

The Reform now suggested involves neither increase in the number of Days of the Year as required in Julius Cæsar's time, nor yet the decrease of Days in the Year as in Pope Gregory XIII.'s time; but simply the re-arrangement of the Days according to a common-sense plan to meet modern requirements.

The first printed Almanac known in Europe was published in 1457, and the first printed Almanac published in England about 1497.

In Queen Elizabeth's reign monopoly to sell Almanacs was granted to two members of the Stationers' Company, whose families enjoyed that privilege until well into the 19th Century.

The first Almanac free from Astrological nonsense was issued in 1828 as "The British Almanac," since which time the issue of Almanacs has been more profuse as years have advanced, but all have been constructed on the old plan of twelve erratic months, quietly ignoring the inconvenience of the arrangement, and regardless of the growing requirements of modern life and commercial methods, which are now so vastly different to those of nearly 2,000 years ago when the Roman 12 monthly divisions began.

The absurd astrological nonsense and weather prognostications which characterised British and European Almanacs prior to the 19th Century, indicate that definite date Almanacs had been copied from the East, where the fixed Seasonable weather was rightly foretold on the Calendar; but the attempt to so allocate the erratic British weather to Calendar dates, now appears so utterly impracticable that we can only pity the credulity of the simple folk who were thus misled, as some still are by "Old Moore's" and other nonsensical "prophesies" in the old style Almanacs.

The Almanac constructors probably felt impelled to adhere to the mystic formulæ of the Eastern originators of the Calendar. There was a distinct incentive to do so, as the longer they could continue to mystify the people, the longer would their income from such Almanacs be maintained:—The force of that reasoning we may better understand from the fact that Almanacs became cheaper as soon as ideas of Almanac construction were developed by persons outside the exclusive class of "Almanac-makers," who cherished thoughts of the "good old times" when the first printed Almanacs of "Regiomontanus" (Nuremberg, 1472) were sold at ten golden crowns per copy.

The earliest Calendars published in Europe *were written* about 1150. Previously the Festivals, Months, etc., were proclaimed by the priests and heralds, who kept "Clog or Wood-carved Almanacs" for their yearly tallies.

ANCIENT CLOG ALMANACS.

During many centuries, before the invention of printing, and even before the introduction of writing, the squared-edged oblong clogs, like the one in St. John's College, Cambridge, and that here illustrated with hieroglyphic signs and symbols cut along its edges, were used to denote the yearly times and locate Church and State Festivals throughout Northern Europe, and indeed almost throughout the World. There are good reasons for believing that they may have been in use before the time of Abraham. They seem modelled after the style of the Egyptian Obelisks which certainly date back over 4,000 years, and as wood-carving was naturally developed before stone-sculpture, and wood records were so much handier, it is probable that similar Clog Almanacs were used for recording time in varying periods from the dawn of civilization. Therefore, a description of these ancient emblems may here be of interest, particularly as it appears to explain the origin of the term "Almanac," which has been the subject of more dispute than any other word in the world.

Mr. John Brady, on page 43, in his useful work, "Clavis Calendaria" (Longman's, 1815), analysing the Calendar, concludes that Verstegan's evidence is the most to be relied upon. Referring to our ancient Saxon ancestors Verstegan says:

"They used to engrabe upon certain square sticks, about a foot in length, . . . the courses of the Moons for the whole Year, whereby they could always certainly tell when the New Moons, Full Moons and Changes should happen, as also their Festival Days, with Easter and other moveable Feasts. Such a carved stick they called an 'Al-mon-aght'; that is to say Al-mon-heed, to wit, the regard or observation of all the moons."

As the Moon or Month was the first long-time "year" or unit counted by the earliest recorders of Time, that appropriately begins the Clog record in the style which probably dates back to the month-time counting of Methuselah's age.

The Runic dots and crosses which fill the *left side* spaces down each of the 4 corners of the "Clog" and constitute nearly three-quarters of its carving, were all essential to denote the coming phrases of the Moon by those crude records of the "Golden Numbers," the first of which by its three dots . . . opposite January 1st, takes us back to the very establishment of the Catholic Church in 325 A.D., when Constantine the Great called together and presided over the Christian Leaders from all parts of the then known World at the famous "Council of Nice" in Asia Minor, when the renowned Nicene Creed embodying the doctrine of the Trinity was promulgated, and the unfortunate rule established by which Easter is still varied from year to year according to the changing Moons.

The Christians of the great University and Observatory at Alexandria, having 2 years before (in 323 A.D.), observed the New Moon next to the Spring Equinox and rightly counted 2 golden numbers, the Nicene Council decided to continue that count.

It was because the "Golden Number," in the year 325 A.D., was 3 (numbering 3 in the years 1 to 19 of the Metonic or Lunar Cycle—after which the New and full Moons appear on the same days of the Year as 19 years before), that the three dots . . . were cut opposite January 1st.

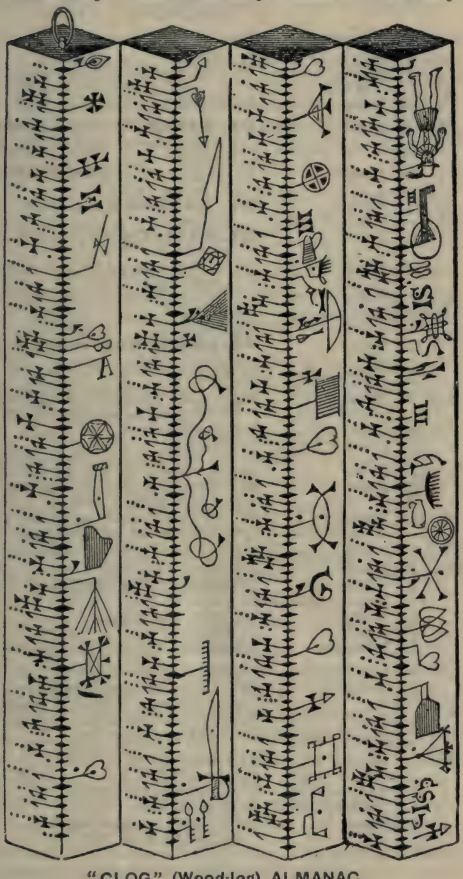
These Golden Numbers are shown up to four . . . . by dots. For 5 a line is drawn to the left of the cut (formerly called notch a term still used by rural boys, who by such cuts record their cricket runs or tally corn by such "notches"), with a hook turned down like a V. To this sign a dot is added to represent 6, two dots for 7, three for 8, and four for 9; beyond which 10 is shown by X across the line. Additional Dots 1 to 4 extend the record to 14. Then the V back-hook added to the end of the X line denotes XV. Still three more dots extend to XVIII,, whilst finally two patulous crosses mark the maximum 19.

The consecutive marks are designed by successively adding 8 to the preceding one (or adding 11 to the following one), and casting aside 19 whenever 19 is exceeded. Thus to 3 for January 1st add 8 = 11, shown opposite January 3rd; 8 more added make 19, as shown for 5th January; 8 more = 8 for January 6th, plus 8 more, = 16 for January 8th.

The marks repeat with the recurring Moons in alternate 30 and 29 day periods, thus on January 1st, January 31st, March 1st the . . . repeat. The signs are adjusted for Embolismal months.

The center-cuts down the edges denote the days in the Year as a Perpetual Calendar where the 1st of each month is denoted by an upturned patulous stroke. Beginning with a deep cut for Sunday (as it will fall on January 1st, 1905), there follow 6 smaller cuts for the work-days. These recur as week-days throughout the

four notched edges which represent the four Quarters of the Year. As ordinary years end on the same week-days as they begin, the next year begins a day later on this Perpetual Calendar, or 2 days later after Leap Year; therefore the users counted off so many notches down, *e.g.*, January 1st, 1906, will fall on a Monday, and all days that year appear 1 day lower upon the Clog. January 1st, 1907, will be on a Tuesday; January, 1908, on Wednesday; and January, 1909, on Friday.



"CLOG" (Wood-log) ALMANAC.

Though illustrated as four logs, these notches are cut upon the 4 edges of the one square-sided Clog Almanac, on the top of which are inscribed . , : , ∴ , & : : to mark the Quarters then counted from the top ring by which it used to be chained to the Altars of the Monasteries and early Churches, to be handy for the Abbot or Priest to refer to when giving his congregation notice of the coming Festivals, which are denoted by the hieroglyphic signs representing typical actions, offices or endowments of the Saints, in addition to which the agricultural work of the year, (*e.g.*, the Hay-rake on June 11th) were sometimes shown. But the priests discouraged such secular additions which enabled men to know the Times of the year without attending church.

INDEX KEY to CLOG ALMANAC SYMBOLS

The *dots* in the middle of the Chief Festival signs and on the preceding day denoted that *Vigils* or *Fasts* were to be kept.

B.V.M.—Is a contraction for the "Blessed Virgin Mary."

Date.	Sign.	Day Names.
Jan. 1	*Oval.*	Circumcision (New Year's Day).
„ 6	*Star.*	Epiphany (*Old Christmas Day or* Twelfth *Day*).
„ 13	*Bishop's Cross.*	St. Hilary.
„ 17	*Dumb bells.*	St Anthony.
„ 25	*Axe.*	ST. PAUL (*St. Paul suffered martyrdom by the axe*).
Feb 2	*Heart.*	Purification of B.V.M
„ 5	*A.*	St. Agatha.
„ 14	*Fortune's Wheel.*	St. Valentine (*true lover's knot*).
„ 24	*Swingle-tree.*	St. Mathias.
Mar. 1	*Welsh Harp.*	**ST. DAVID** (*the Patron Saint of Wales praised God upon the Harp*).
„ 2	*Bough.*	St. Cœgda or St. Chad (*symbol of the hermit's life*).
„ 12	*Square* (4 Seasons).	**ST. GREGORY** (*Calendar Reformer*).
„ 17	*Shamrock.*	**ST. PATRICK** (*the Patron Saint of Ireland*).
„ 25	*Heart.*	THE ANNUNCIATION, B.V.M LADY DAY.
April 3	*Spear.*	St. Richard.
„ 4	*Arrow.*	St. Isadore.
„ 23	*Lance.*	**ST. GEORGE** (*the Patron Saint of England*).
„ 25	*Cross-squares.*	St. Mark.
May 1	*Branch.*	MAY DAY (*country festival—day for bringing home May blossom*).
„ 3	*Cross.*	Finding the Cross.
„ 19	*Trumpet curves.*	St. Dunstan.
June 11	*Rake.*	St. Barnabas (*Hay Harvest symbol*).
„ 25	*Sword.*	St. John the Baptist (*who was beheaded with a sword*).
„ 29	*Two Keys.*	ST. PETER (*typified as having the keys of Heaven and the Church*).
July 2	*Heart.*	Visitation of B.V.M.
„ 7	*Mitre-cross.*	Translation of ST. THOMAS.
„ 15	*Clouded Wheel.*	St. Swithin.
„ 22	*Teapot.*	St. Mary Magdalen.
„ 25	*Brush.*	St. James.
„ 26	*Diamond.*	St. Anne.
Aug. 1	*Umbrella.*	LAMMAS DAY.
„ 10	*Gridiron.*	St. Lawrence (*was laid on a gridiron and broiled to death*).
„ 15	*Heart.*	Assumption of B.V.M
„ 20	*Crossed curves.*	ST. BARTHOLOMEW.
Sept. 1	*G.*	St. Giles.
„ 8	*Heart.*	Nativity of B.V.M.
„ 14	*Arrowed Cross.*	Exaltation of the Cross.
„ 21	*Out-cut Square*	St. Matthew.
„ 29	*Scales.*	St. Michael the Archangel. MICHAELMAS DAY.
Oct 13	*Inverted man*	St Edward the King Confessor (*who was crucified head downwards*)
„ 18	*Signal.*	St. Luke (Evangelist).
„ 25	*Shoes*	St. Crispin (*Shoemakers' Patron St.*)
„ 28	*S.J*	St. Simon and St. Jude.
Nov. 1	*Curved Squares.*	All Saints.
„ 2	*S.*	All Souls.
„ 11	*III*	St. Martin. MARTINMAS.
„ 20	*Brush.*	St. Edmund (King).
„ 23	*Pot.*	St. Clement (*alluues to old custom of then begging for drinks.*)
„ 25	*Wheel.*	St. Catherine (*martyred on a wheel*).
„ 30	X.	**ST. ANDREW** Apostle. (*The Patron Saint of Scotland. He was crucified on an* X*-shaped cross.*)
Dec. 6	*Thr.e Hearts.*	St. Nicholas.
„ 8	*Heart*	Immaculate Conception of B.V.M.
„ 13	*Drop Sign*	St. Lucy.
„ 21	*Mitre*	St. Thomas.
„ 25	*S. Horn.*	CHRISTMAS DAY (*signifying the time to rejoice and be merry by wassailing or drinking*).
„ 31	*Cross.*	St. Silvester (*New Year's Eve—Hogmanay*).

WHY SEEK TO CHANGE THE MONTHS?—Because of the DISADVANTAGES AND INCONVENIENCES OF THE PRESENT MONTHLY ARRANGEMENT.

It seems absurd, and obviously confusing, to have in use two conflicting kinds of months, the Calendar months of 28, 30 and 31 days and the month of 4 weeks, which seems ingrained in the popular mind.

The present system of 12 uneven months is inconvenient and causes needless trouble and injustice to the community, as instanced below.

e.g. A maid is engaged on 9th February for a month on trial at £24 a year, and on proving unsatisfactory, leaves on 9th March, receiving £2 for 28 days, whereas only $\frac{28}{365}$ of £24 = £1 16s. 10d. has been imperfectly earned—thus 3/2 (9½d. per week) or 9% in excess is unjustly demanded.

On the other hand had the maid been engaged over a 31 days month-end, she would have received 9d. less than her due.

This irregularity is constantly affecting the monthly receipts of millions of servants, sailors, and others, even although they keep in constant employment.

The middle class housewife who gets her "monthly allowance" for housekeeping, etc., often finds herself short of money at the end of months containing 5 week-ends, when each entails payments to grocer, butcher, etc.

Further, the larger number of clerks and other employees receive monthly salaries, which for simplicity we assume average £60 a year, = £5 per month, whereas February's $\frac{28}{365}$ths only = £4 12s. 1d., (7/11 less) whilst March should be £5 1s. 11d.

A large proportion of these have to pay weekly board and lodgings, etc., hence, as in last year, when March, June, August, and November each contained 5 Saturdays, their proportionate expenditure would approximate £5 15s. 5d. for each of those months, and in many cases the landlady would have to be humbly told on the last Saturday, "I'm sorry that I cannot pay you till my salary is due in—days,"—meantime the poor landlady's monthly rent is called for and she is also unjustly obliged "to eat humble pie."

Numerous like cases might be adduced as prejudicially affecting many other classes of the community, such as sailors, pensioners, etc.

The foregoing instances may appear trivial to wealthy persons, but those who live amongst the toiling masses well know that these differences, due to the erratic calendar, do occasion real hardship to deserving people.

No doubt many people of small means, without adequate margin for such contingencies, have been thereby tempted into the hands of pawnbrokers and money-lenders, and so ruined.

The above incongruities apply with equal force to Rents, Interests, and all Receipts and Payments based on the present subdivision of the Year into 12 months.

This absurd arrangement of unequal months

CAUSES INCONVENIENCE, WORRY, AND LOSS IN BUSINESS AND DOMESTIC ARRANGEMENTS.

(*a*) Accounts are usually rendered to customers per Calendar month, but wages, etc., of employees being paid weekly involve 5 weekly payments in several months, hence the monthly income and expenditure are disproportionate.

(*b*) The broken oddments of weeks at the month-end prevent the easy balancing of manufacturers' and tradesmen's accounts monthly because of the difficulty of adjusting wages, etc., but the difficulty has to be faced at considerable trouble and expense each half year if the accounts are to be true. The month-end adjustments of split weeks apply to about 9 month-ends each year, hence about 10 per cent. of useless extra work is caused in railway and other accounts, etc., involving millions of hours of absolutely wasted labour. *e.g.*, December ends this year on Wednesday, therefore the wages of engine-drivers, guards, signalmen, porters, etc., who are paid *weekly* have to be divided into 4 days for this month and year, leaving the remaining 3 days for next year as the salaries of officers, clerks, etc., are paid monthly, and the costs of engines, trains, stations, etc., are charged half-yearly. Months of 4 weeks would immensely facilitate monthly balancing of all trade, etc., accounts.

(*c*) Most firms have a fixed date, as the 15th or 20th of the month, for paying monthly accounts, but when that falls on an inconvenient week-day the date has to be altered. Others battle with the Calendar by fixing, say, the 3rd Tuesday of the month.

Royal Birthdays, etc., could always be held on the same date each year and the present uncertainty, proclamations and confusion avoided if the suggested Reforms were made in the Almanac.

The poor undoubtedly suffer most through the present defects of the Calendar. I have already mentioned the loss of their potato crops through the early Easters misleading them. Other garden crops are likewise affected, whilst further loss is frequently caused to their little stock of domestic animals through inadvertent neglect at the time of increase, due to errors arising from the erratic months in computing the weeks or days of gestation.

That applies also with added force and entails much unnecessary worry to anxious mothers whilst carrying their young during the distinctive periods of human increase, which date respectively 5 and 10 months of 28 days each, *i.e.*, 280 days, which young mothers commonly estimate as 9 months, to their confusion, since 9 Calendar months only average 275 days.

Medical men have their Maternity Tables, readily used for the mothers of our middle and upper classes, but the poor mothers of our

toiling masses who have to bear the heaviest labours and the brunt of our strenuous industrial life, are left to puzzle out those anxious times which could be plainly indicated by the *Rational Almanac*, as from any date in the 1st month to the corresponding date in the 11th month would be 280 days, whilst from the dates in the 2nd month to the like dates in the 12th month would be exactly 280 days, as the following will show:—

	Conception.	Quickening.	Birth.
Old COMPLEX Style	Jan. 1	May 20	Oct. 8
	March 15	Aug. 1	Dec. 20
Proposed SIMPLE Style	Jan. 1	June 1	Oct. 1
	1	6	11
	March 15	July 15	Dec. 15
	3	8	13

The small figures indicate the numbers of the proposed months of 28 days (4 weeks) each.

Some prudes may quibble at this reference to the vital factor governing the continuity of our race. Let such investigate the anxieties of early motherhood amongst poor people, then they will not fail to realize the mental suffering caused by the public neglect of true training and knowledge for prospective mothers.

Our poor women have suffered far too much in the past through this defective Almanac arrangement and lack of information, from which privileged medical men only reap a paltry advantage. Let us be frank with them and give the simple guide they need and are entitled to, without causing mental anxiety by such uncertainty, when that needed knowledge would be so welcome to all true mothers.

Why should we longer mislead these poor women by the old defective Calendar? The removal of this cruel uncertainty caused by the present *Irrational Almanac* to poor mothers who should receive our utmost consideration, seems almost sufficient reason for the reform desired, but the more we examine the working of the present Calendar the more real is the need for its amendment forced upon our minds.

The long, sad history of the County Courts throughout the land tells of many lives blighted through these uneven months. Poor but respectable people, overtaken by illness or difficulty, are, for the first time, hauled before the Court and ordered to pay a given sum per month—say on January 9th. They, having a very narrow margin to live upon, plan to get it to Court by February 9th, but the Court's month (4 weeks) having expired on the 6th February, the bailiffs are put in by the 7th or 8th, and the home is ruined, whilst the expenses incurred make it extremely improbable that the poor people will ever recover their position again, especially if the increasing burden of a young family is coming upon them. What this may mean in misery to that and even succeeding generations of the family is most sad and serious to consider.

This indirect injustice is almost continuous, as it arises on 11 months in the Year (or more strictly 45 months in each 4 years period),—February being the only month excepted.

The County Courts of necessity had to adopt "the month of 4 weeks," because the wages of the people are generally paid weekly. Building Societies, Saving Banks, Friendly Societies, Trades Unions, and all extending progressive organizations are being compelled by force of circumstance to recognise "the month of 4 weeks," for undoubtedly *the week* is becoming more and more the *working unit of our business and social life*. 365 days cannot be *evenly* divided into 12 months, and even if they could, the week-days of such 12 months would vary.

Although casual readers might think these differences of small importance, I can assure them that if time admitted them to personally investigate, as I have done, they would be astonished to find the vast amount of trouble already caused by such apparently small differences in America and Germany, where the necessities of business competition and management require more exact apportionment of costs and truer ascertainment of actual expenditures per article, machine, etc., than our cruder methods can give.

For instance, last year January had 27 working days against February only 24, thus the former had 12½% or ⅛th more working days, therefore the Railway Companies, large corporations, manufacturers, etc., recognise the absurdity of debiting February Accounts with $\frac{1}{12}$th of the year's expenditure on salaries, establishment charges, etc., as 8·33%, when only 7·72% is approximately chargeable.

The difference of ·61% on the United States Railway earnings of $1,750,000,000 being $10,850,000 is so great, that we need not wonder why so many money-grubbers turn Stock Exchange gamblers whilst seeking to "scalp the markets" for such differences at the expenses of the toiling masses, when that may indicate a relative difference in dividend, and consequent rise or fall in share values.

American railway and business managers need to be much more exact. They charge out and pay for the true time expenditure incurred each month, as every manufacturer, contractor, engineer, etc., who rightly desires to know the cost of any particular work by labour or machine or both must do.

The Railway Companies, Corporations, etc., wrestle with the Almanac's irregularities by computing each of their vast numbers of salary items in the monthly pay rolls as 24, 25, 26, 27, 28, 29, 30 or 31 working days per month for each man, and then have to go to great trouble in splitting up their vast number of weekly wage payments, etc., into parts of weeks ending one month and beginning the next, to find their monthly expenditures for comparison with the previous and corresponding monthly expenditures and earnings which are similarly split up; but even then they can only approximate, and cannot truly compare with any other month in the same or preceding years because the week-days are different during each period.

But our American and German competitors certainly get truer estimates of current costs, though they toil through much labour which could be saved by a simpler Calendar that would give truer and better results.

The United States Government, for the convenience of its employees (who like all other workers prefer to be paid according to the time they work), battles with the Almanac's absurdities by calculating in 365ths of a year the 28, 29, 30 and 31 day parts of the year for each of the monthly pays of its vast army of salaried officials, clerks, etc.

The disparity even in the simpler American periods is evident from the following Table :—

AMERICAN WORKING DAYS IN EACH YEAR, excluding Sundays, Independence Day (July 4th) and Christmas Day.

DIVISIONS OF THE YEARS.	1900.	1901.	1902.	1903.	1904.	1905.
MONTHS.						
JANUARY	27	27	27	27	26	26
FEBRUARY	24	24	24	24	25	24
MARCH	27	26	26	26	27	27
APRIL	25	26	26	26	26	25
MAY	27	27	27	26	26	27
JUNE	26	25	25	26	26	26
JULY	25	26	26	26	25	25
AUGUST	27	27	26	26	27	27
SEPTEMBER	25	25	26	25	26	26
OCTOBER	27	27	27	27	26	26
NOVEMBER	26	26	25	25	26	26
DECEMBER	25	25	26	26	26	25
QUARTERS.						
3 Months ending						
MARCH 31ST	78	77	77	77	78	77
JUNE 30TH	78	78	78	78	78	78
SEPTEMBER 30TH	77	78	78	77	78	78
DECEMBER 31ST	78	78	78	78	78	77
HALF-YEARS.						
6 Months ending						
JUNE 30TH	156	155	155	155	156	155
DECEMBER 31ST	155	156	156	155	156	155
CALENDAR YEAR.						
12 Months ending						
DECEMBER 31ST	311	311	311	310	312	310

Although these only appear to vary about alternately, they are all differently complicated each year, because the respective "Week-days" only successively repeat for monthly comparison in March, when the first four weeks of March compare with February dates in non-leap years.

Actually no two months in a year are ever comparative, nor yet are the months truly comparative with the corresponding months of the previous year, as the Saturdays when employees work half-days, or Sundays when they do not work at all, vary in Dates.

Other comparisons are vitiated by our absurd changes of the Festival and Holiday Dates without any useful purpose as shown by the heavier typed figures altered in the following table, because Good Fridays, Easter Mondays, Whit-Mondays and August Bank Holidays are Working Days in America, but Holidays in England:—

COMPARISON of BRITISH WORKING DAYS in EACH YEAR excluding Sundays, **Good Fridays, Easter Mondays, Whit-Mondays, August Bank Holiday** and Christmas Day.

DIVISIONS OF THE YEARS.	1900.	1901.	1902.	1903.	1904.	1905.
MONTHS.						
JANUARY	27	27	27	27	26	26
FEBRUARY	24	24	24	24	25	24
MARCH	27	26	**24**	26	27	27
APRIL	**23**	**24**	26	**24**	**24**	**23**
MAY	27	**26**	**26**	26	**25**	27
JUNE	**25**	25	25	**25**	26	**25**
JULY	25	26	26	26	25	25
AUGUST	**26**	**26**	**25**	**25**	**26**	**26**
SEPTEMBER	25	25	26	25	26	26
OCTOBER	27	27	27	27	26	26
NOVEMBER	26	26	25	25	26	26
DECEMBER	25	25	26	26	26	25
QUARTERS.						
3 Months ending						
MARCH 31ST	78	77	**75**	77	78	77
JUNE 30TH	**75**	**75**	**77**	**75**	**75**	**75**
SEPTEMBER 30TH	**76**	**77**	**77**	**76**	**77**	**77**
DECEMBER 31ST	78	78	78	78	78	77
HALF-YEARS.						
6 Months ending						
JUNE 30TH	**153**	**152**	**152**	**152**	**153**	**152**
DECEMBER 31ST	**154**	**155**	**155**	**154**	**155**	**154**
CALENDAR YEAR.						
12 Months ending						
DECEMBER 31ST	**307**	**307**	**307**	**306**	**308**	**306**
Odd week days recurring on 53 dates during the respective years.	M.	TU.	W.	TH.	F. & S.	SUN.

The heavy figures in this Table show how that senseless changing of Festival Dates varies the working days in our months as compared with the preceding American Table.

Although these only appear to vary about alternately, they are all differently complicated each year, because the respective

"Week-days" only successively repeat for monthly comparison in March, when the first four weeks of March compare with February dates in non-leap years.

The American employers stoutly decline to be inconvenienced by changing Easters, Whitsuntides, etc., so they work their men through Good Fridays, Easter Mondays, Whit-Mondays, etc., which thus do not affect them. But in England these holidays moving in March, April, May and June prevent fair comparisons and true analysis of costs, besides needlessly disturbing our Sessions of Parliament, Law Courts, College, School and Business Periods.

Throughout Europe this troublesome change of Easter and Whitsuntide dates creates like difficulties, which are there further increased by other varying holidays contingent upon Easter and other Festival dates.

To show how the variation of week-day names for yearly dates, Easter, etc., affect the earnings of shopkeepers, manufacturers and Railway Companies, etc., a further Table is appended.

WEEKLY, MONTHLY and HALF-YEARLY GROSS EARNINGS.

WEEKLY	Small Shopkeeper.	Colliery Co.	Railway Co.
Sun....	—	—	3,000
Mon.	1·4	200	18,000
Tues.	1·2	200	17,000
Wed.	1·1	200	17,000
Thurs. ...	1·0	200	17,000
Fri.	1·8	200	17,000
Sat.	3·5	—	11,000
	£10·0	£1,000	£100,000

MONTHLY	1903. £	1904. £	1905. £	1903. £	1904. £	1905. £	1903. £	1904. £	1905. £
Jan.	46·3	45·3	42·6	4400	4200	4400	445000	431000	438000
Feby.	40·0	41·4	40·0	4000	4200	4000	400000	418000	400000
Mar.	42·6	43·3	43·9	4400	4600	4600	438000	451000	451000
April	40·1	42·1	40 3	4000	3800	3600	405000	399000	385000
May	45·3	41 2	43·7	4200	4200	4600	431000	423000	452000
June	41·2	42·1	41·4	4200	4400	4200	420000	434000	419000
July	43 9	45·3	44·9	4600	4200	4200	451000	431000	432000
Aug.	43·5	42·3	42·1	4000	4400	4400	417000	437000	436000
Sept.	42·3	42·8	45·3	4400	4400	4200	434000	434000	428000
Oct.	46·3	44·9	42·6	4400	4200	4400	445000	432000	438000
Nov.	41·4	42·3	42·1	4200	4400	4400	421000	434000	434000
Dec.	38·0	44·9	42·7	4400	4200	3800	429000	430000	402000
YEAR	510·9	517·9	511·6	51200	51200	50800	5136000	5154000	5115000
1ST ½ YEAR	255·5	255·4	251·9	25200	25400	25400	2539000	2556000	2545000
2ND ½ YEAR	255·4	262·5	259·7	26000	25800	25400	2597000	2598000	2570000

In compiling the above monthly apportionments the following British holidays have, for simplicity, been treated as Sundays:—

	1903.	1904.	1905.
Good Friday.....	April 10	April 1	April 21
Easter Monday	April 13	April 4	April 24
Whit-Monday	June 1	May 23	June 12
1st Monday in August	Aug. 3	Aug. 1	Aug. 7
Christmas Day.....	Dec. 25	Dec. 25	Dec. 25
Boxing Day	Dec. 26	Dec. 26	Dec. 26

(*Why not have the upper four holidays fixed like the lower two?*)

This basis is quite near enough for practical comparison, as although Railways earn more than Sunday Fares for Passengers on Easter Monday, Whit-Monday and Bank Holidays, they lose more on their Goods and Mineral Traffic not only on those Mondays but also on the Tuesdays, etc., following, as workers then prolong their well-earned holidays.

The railway totals of £5,136,000, £5,154,000, £5,115,000 for the years 1903, 1904 and 1905 will

suffice to locate the origin of these differences for which Stock Exchange Gamblers strive.

In 1904, being a Leap Year, we have an extra Friday and Saturday, accumulating an earning proportion (as per the top basis of the estimate) of £28,000 increase, less decrease £10,000 = £18,000 added to the previous year's total.

In the year 1905 there are two less working days, as both its first and last days are Sundays, therefore for comparison with 1904 we have not only to deduct the value of £28,000 for its extra Friday and Saturday, but also to estimate the confusing fact that Christmas Day in 1904 was a Sunday and that year had 53 Sundays.

The fact of Christmas, 1904, falling on Sunday will deprive millions of workers of the second (Boxing Day) Christmas holiday when they have already worked the extra leap year day.

As a matter of fact, salaried officers, clerks, servants, sailors, etc., this 1904 year, work two more days for the same payment as they got last year and will get next. That is not fair. Leap Day should be a public holiday in midsummer, and Christmas Day always recur between Sunday and Monday as I suggest, then no such inequalities and injustice would arise. Poor clerks, etc., should have had those two extra days holiday, instead of working them for nothing.

The two extra work days in 1904 will inflate its half-yearly and yearly earnings, causing share values to rise towards the year's end and thus increasing the gamble.

Now it may appear simple to adjust these comparative earnings for 1905 till we take out the differences for the varying days, thus :—

Variations of Estimated Railway Earnings from 52 weeks, + plus the odd Yearday and Leapday, — minus usual holidays, alike in each year (except Christmas Day, 1904, on Sunday).

1904.

	Plus. £		Minus. £
Christmas Day (Sunday).....		as Sunday.....	
Dec. 26th, Monday, ...	3,000	... ...	18,000
Dec. 30th, Friday, ...	17,000		
Dec. 31st, Saturday ...	11,000		
	+ 31,000	—	18,000
Less	— 18,000	<———	
Leaves	+ £13,000		

1905.

	Plus. £		Minus. £
Dec. 25th, Monday,	3,000	... ...	18,000
Dec. 26th, Tuesday,	3,000	... ...	17,000
... ...	... ...	... ...	... ...
Dec. 31st, Sunday,	3,000	... ...	... ...
	+ 9,000	—	35,000
——————>		+	9,000
		Leaves (1905) —	26,000
——————>		Add (1904) +	13,000

Showing a combined difference of £39 000 less earnings in the year 1905, than in 1904, as seen by the Table where £5.154,000 — £5,115,000 = £39,000. That is entirely due to Almanac causes, other data being assumed as progressing equally throughout each year.

Now although that £39,000 is only ·76% decrease from the £5,154,000 (1904) total, the Almanac effect on the net earnings upon which the Dividend depends is in greater ratio, as proved below.

Taking the last published Report of the Board of Trade on Railways for the year 1902 as our basis, we may extract the following items of Expenditure, which will not be increased by the two extra work days in 1904.

General Charges	2·3	per cent. of Total Receipts.
Rates and Taxes	3·7	" " "
Legal and Parliamentary Expenses	·3	" " "
Miscellaneous	1·7	" " "
	8·0	
Add ½ the following, as they would not be at all likely to be increased by so much :—		
Maintenance of Way and Works	9·3	
Repairs and Renewals to Carriages and Wagons	5·0	
	2)14·2 = 7·2	" " "

Thus on the extra £39,000 there would be ... ...15·2 % less Expenses incurred, than the average ... ...62·0 % of Receipts expended by British Railways, therefore the results would be as follows:—

	1903.	1904.	1905.
	£	£	£
Receipts ...	5,136,000	5,154,000	5,115,000
Expenditure 62·0 % =	3,184,320		3,171,300
62 % of £5,115,000 =		£3,171,300	
62 % — 15·2 % = 46·8 % of £39,000 =		18,252	
		£3,189,552	
Net Receipts	£1,951,680	£1,964,448	£1,943,700
(*a*) Average of 62% of Profits fixedly go to British Preference and Debenture Holders.	1,210,042 fixed	1,210,042	1,210,042
Leaving **Residue Receipts** for Ordinary Shareholders	£741,638	£754,406	£733,658
Difference		+ £12,768	— £20,748

The combined difference of **£33,516** paid in Ordinary Dividends is caused by the Almanac, and over the whole British Railways in the ratio of Net Receipts would amount to as £1,964,448 : £41,628,502 :: £33,516 : **£710,236,** which is quite sufficient to induce a great gamble on the part of the thousands who are seeking to thereby gain what they can of it.

(*a*) I had to adopt the Board of Trade Report of Preference and Debenture Capital basis of 62 % for estimating the Net Receipts disbursed for "fixed preference charges" as I could not get all the Railway Balance Sheets to analyse, but as the nine large Railways showed 61 % when so analysed and the smaller ones are more burdened with Preference Capital, that 62 % seems right.

It is very remarkable that the most useful and interesting figures which should result from the elaborate Railway Statistics now compiled, are not prepared nor published—I refer to the vital gambling factor of RESIDUE RECEIPTS available for Ordinary Shareholders, as upon that chiefly depends

the incentive to buy and sell shares, which are thus raised and lowered in value whilst further re-acting upon the values of the Preferred and Debenture Stock.

Surely the most valuable figures wanted from the Railway Statistics are those recording the Residue Receipts for Ordinary Shareholders, as all Share Speculation depends on them: therefore the Net Receipts figures should be sub-divided into their payments made to Preferred and Ordinary Proprietors and that essential information published.

The differences shown will, in some cases enable the Directors to just pay an extra ¼ % Dividend they would otherwise have been a little short of. That again forces up the value of the Shares, as the small investors who bought say two Shares at **150** each when they were paying 4½ % appreciate their value at 4¾ %, as 4½ : 4¾ :: 150 : **£158,** hence the Almanac created difference may not only currently bring in ¼ % more Dividend, but what is far more important in its gambling effect, it may result in the thirty-two times greater gain of £8 in Share values.

That may be considered exceptional through being dependent upon Leap-Year, we will therefore more simply test the time basis of profits accruing during successive half-years.

Applying the authentic figures Tabulated on page 36 to Stocks and Shares, in which most of the people's savings are invested, we may realize more of the harm done by our present irrational Calendar—especially to the industrious and thrifty workers who toil nearly a life-time to save an independence or provision for "old age." They invest their hard earnings say in Railway Shares for security, and then what happens as they anticipate their Half-yearly Dividends? They begin to watch the newspaper fluctuations in the Shares they are interested in, and (assuming a very simple case so that readers can easily understand from the table on page 36) say they invested in Railway Shares at 152 in June, 1902, which rise in value to 155 by December, 1902, simply because of the three extra working days' earnings during the latter half-year. During the following six half-years it ebbs and flows like a tide to 152, 154, 153, 155, 152 and 154 respectively, owing to our present irrational Almanac uneven half-years, as obviously if the profits on 152 days' work are capitalised as £152, the value for 154 days would be £154, assuming that the earning power is equal and regular.

Investors, like fish, grow hungry with the changing tides and bite best when prices are rising through the efforts of those who know the relative values of railway earnings during these lengthening and shortening periods; the unsuspecting toilers with savings to invest, seeing in the newspapers the rises made, think it a good time to invest, as the simple ones generally do about the time top-prices are reached; then the sharks as professional investors come in and scare the pretty fishers by bearing down prices as the lesser earnings

accrue whilst the first half of each year is passing; the timid new investor, anxiously watching the diminishing value of his life's savings, is easily scared into parting with his holding at its lowest price after receiving the unsatisfactory early Half-yearly dividend, especially about August and September, when money is wanted for Holidays.

That is the Professional Investors' opportunity for buying at the lowest prices and simply holding until they can force prices higher after a few months, in order that they may thus not only have the sport but (without working any real good for the community) gain the cream from the workers' hard earnings.

The ever-growing armies of "do nothings" thus increasingly thrive upon the labours of the toilers who are doing the hard work for our race, as others seeing the easy life such schemers live, are led to flock in to gain by gambling instead of useful work.—Many of them truly say, "We can gain more in a day "by these differences than a year's labour "of our hands could win."

They call it "Scalping the Market" as they plan to win, often without depositing a cent of purchase money. Should that not rather be called "Scalping Humanity"? as not only the labourers but the poor women and children suffer even more from that unfair diversion of the wealth they or their relatives have created.

Thus it is that droves of gambling men and women frequent the offices of stockbrokers farming profits they have not earned and pillaging wealth they have done nothing to create, whilst they thereby impoverish the poor labourer of his hire, as they inflate the price of shares till buyers at high rates demand such high dividends that they do not allow of adequate remuneration to their servants.

Let us roughly estimate the resulting value of that irrational Almanac diversion and gamble upon a thrifty Artisan's life savings of say £310.

With that, late in 1902 he bought 2 shares of £100 each at 155, which he held till the Summer dividend of 3 per cent. was declared in August, 1903. He receives £3 for the Half-year which only yields 2 per cent. on his £155 outlay per share, and being disappointed is easily induced to sell at the then market price of £152 per share, which only yields £304 + £3 Dividend = £307, instead of his original £310 + £10 = £320, he expected when the last Dividend was 5 per cent. (British Railways average 3 per cent. for the First Half-year and 5 per cent. for the Second Half-year). He is thus £13 less than anticipated, and excluding dividend has lost £6 of his Capital—now reduced to £304.

A wily "Outside Broker" tells the Artizan that the buying of Shares outright is not the way to make money and persuades him to open a "contango account," which enables the broker to gain commissions and "break into" the bulk of the Artisan's savings, then easily exhausted before "old age" appears.

It is a sorry spectacle, but note the strong inducement to the investor to gamble in this money-grubbing age where the hoarding of money is crushing out so much of what is best worth having in the love of home, contentment, peace and goodwill to neighbours, consideration for the betterment of our less fortunate fellows, and the development of a nobler race with higher ideals of manhood and a nobler social life.

The broker or gambler in shares has gained from the poorer man £6, which is double the amount of Dividend, whilst the intrinsic value of the Railway property not only remains the same but has really been increasing during the interval of the two transactions. Passers-by the Stock Exchange and Brokers' Offices, seeing how money can thus be diverted to their gain, are tempted towards the Stock gambling whirlpool which is drawing thousands into its vortex, to the undermining of sound investment and the discouragement of healthy and elevating labour in all countries.

But surely the tide which started this rushing torrent of Stock Exchange Gambling and threatens to paralyse industry, was the uneven earning periods of our irrational Almanac?

Beyond the Tides or pulsations which give life to the gambling spirit through disparity in the numbers of working days, there is the further change of week-day names for dates throughout each month, etc.

Though December, 1903 and 1904, both appear to have 26 working days, their proportionate Railway earnings would be about £429,000 and £430,000 respectively in the typical case estimated at the end of the Table on page 37, showing an increase of £1,000; whereas October, 1904 and 1905, each having 26 work days, show earnings £432,000 and £438,000 respectively, because October, 1904, had a 5th Saturday's earnings to contrast against the 5th Tuesday in 1905, so making the disparity of £6,000.

These differences, due to the defective Almanac, are known amongst the cuter operators on the Exchange, but are generally unknown to the ordinary—especially the new investor, who is thereby handicapped, as the cumulative effect of the differences operate effectively in the half-yearly Dividends as the last two lines of the Table on page 37 show.

Of course there are other causes which help to increase and decrease the prices of Stocks and Shares, and so increase the growing tendency to gamble in them.

As growing trade prospectively increases profits, the rush for shares forces up their values beyond the worth of the extra profits, and thereby induces reckless investment and the growth of mushroom and fraudulent promotions of the Hooley, Whittaker Wright and Morgan types—all designed to "scalp" away the increasing wealth earned by the labours of our industrious toilers, just as the Spring Tides driven higher by favourable winds wash out fruitful soil along our coasts, but leave the barren rocks.

On the receding tide of commercial depression that inevitably results from this gambling in Stocks and Shares which locks up Capital, the designing Stockbrokers leave the rocky and barren investments in the hands of the misled investors, who then are shied off from providing even for the development of sound railway extension, etc.—Railway Company Corporations, etc., restrict capital outlay and borrowing. Investors resort to mortgages on houses our industrious men are building as homes for their later years, and buy or secure mortgages on land around our large cities, where workers have of necessity to build.

The Starving of Capital brought on by the gamble, in a year or two results in the Governments, Corporations, Railways, Industrial Firms, etc., who have so far held aloof, being compelled to raise money at higher prices and rates of interest, consequently rates and taxes go up; these the industrious workers have to pay, and then the monied persons holding mortgages on poor peoples houses finding money rather tight, seize the opportunity to increase the rate of mortgage interest, put up the rents, price of food, etc.—so the fruits of the labour of the industrious classes are impoverished both as these tidal forces ebb and flow.

The toiling masses are shifted and drifted, worn and ground down, at every change in this ceaseless tide, like the helpless sands on the sea shore which know not how the erosive tides are caused.

Though the speculator naturally prefers a rising (bull) market, when he buys say at 100, so that he can hold on and sell out at the top, whether at 110 or more; yet it is about the same to the professional investor, who sells out at the first clear signs of a (bear) market of falling prices, and buys them again at lower prices, say 100. Both the "bulls" and the "bears" as stockbrokers, etc., are quite happy, as they have got say 10% each in brokerages and profits, not from each other, but out of the public at the expense of the toilers. They do not care so much whether shares go up or down, for so long as they can "make things jump" either up or down those "wolves in sheep's clothing" can just as easily appear as "bulls" or "bears" as best suits their purpose.

Their selfish spirit fed on the greed for gain at the expense of others will probably lead them and their gambling customers to impede this Reform, either by icy silence, or if the out-cry for the simpler Almanac becomes too strong, they will probably try to swamp it by ridicule, because they know that the mainspring of the business fluctuations on which they live, originates in the present irrational and unequal periods of our Almanac.

Beyond these, the Produce and Stock Exchange Manipulators organise artificial rises and falls of values to ensnare the public as Leiter, Sully and other reckless "poolers" have done. If they win, they take all the profits; if they lose they become bankrupt

and their creditors bear it, whilst the working classes ultimately suffer disastrously.

The lawyers protect and then renourish these evil-raising gamblers whom they return protected to the arena, whilst the newspapers encourage the gamblers by prating about their "pluck," instead of denouncing their "fraud." The Chinese would meet out much more deserved and speedy justice to such pirates of society.

How long will suffering humanity bear this cruel injustice, which would have fired the Ancient Greeks and Romans to speedily end it? Are we going to idly stand by whilst the rogues of commerce thus rob the poor people wholesale? Or are we going to quit ourselves like men and not only say these iniquities shall not be? Should we not rather make them impossible to develop in the future?

Even whilst I write after the downfall of that despicably mean and greedy American Sully and his fellow-gamblers in Cotton have paralysed the trade of the Lancashire Cotton Spinners and like workers in the United States, Germany, France, India, Japan, etc., causing untold loss and misery to millions of poor people, there are thousands of other lazy Stock Exchange gamblers in all classes of society already buying shares at bottom prices in the depreciated Cotton Mills and Railways serving those districts, to gain the extra profits from the earnings of the long-suffering Cotton Spinners at the end of the next half-year.

Well might the patriarchs of Israel prohibit the taking of Interest. Their degenerate successors having departed from that wise counsel, now seem degraded from the nobler simple life, by the greed for Interest developing in them that ever-growing selfishness which is rapidly becoming the curse of our age.

I do not say that we can now do away with Interest, but we ought to prevent its present gross abuse, and can easily and equitably do that so far as Almanac-caused differences are concerned.

The disastrous effects of Stock and Produce Exchange Gambling on trade generally and its reaction upon the industrious workers as well as national welfare, cannot here be appropriately pursued beyond the important effect of the Almanac's irregularities. The wide-spread evils resulting from that selfish gambling will impress thoughtful observers who note its damaging effect upon the character and mutual respect which used to be the happier factor governing the relations of employers and employed. When the former gamble and the latter suffer, good working relations become strained, especially as the gambling mostly affects "Limited Companies," who tend to become less humane and more exacting than direct employers who are more in touch with their workpeople.

But surely in these days of better education the workers are being taught and forced by circumstances to think for themselves. They have been in a state of lethargy, and are not inanimate like the sea-shore sand. They can

think, and are by such facts as I have already stated, together with the growing evidence of selfishness and combinations amongst Financiers (who have monopolised power and Government control), being forced to remove these impediments to progressive development.

They cannot fail in the near future to realise that the prime cause of this accursed gambling which is so ruinous to the interests of labour and the progress of humanity, is mainly due to the accumulating forces developed by selfish efforts to grasp the fluctuating profits caused by our present irregular Almanac periods.

By effecting this proposed simplification of the Almanac periods, adopting a common-sense reserve plan to pay more even half-yearly dividends (instead of the foolish system of "lean" first half and "fat" last half, frequently making the latter about double the former), and restricting share transactions to *bonâ-fide* shareholders, much of the present evils caused by Stock and Produce Exchange Gambling may be avoided.

Would it not be much more to the interest of sound business and the Shareholders' convenience, if the Directors of Railway, etc., Companies would reserve sufficient from the forth-coming Half-Year ending December 31st Dividend, to equalize its payment with that of the First Half of next Year, as it would be much better for their Shareholders to receive an average of 4 % for both Half-Years, rather than an average of 3 % the First Half and 5 % the Second Half as now, especially as the smaller 3 % has now to last them over the second half-year's private expenditure, which is generally more costly through the expenses then incurred for holidays, Christmas, etc.?

That would steady the money market and so diminish the fluctuations between the two Half-Years, that Stock Exchange gambling would be minimised and the number of *bonâ-fide* investors would be strengthened, whilst the interests of the servants would not suffer as now, when the Directors finding the Shares have been depreciated in value by this wicked gamble, so unfairly curtail the wages of their deserving workmen by "short-time" and stop the fully due scale advances of their clerks (at the most critical time of their lives and when they are giving the best life value to the Companies) to increase the Dividend and restore the Shares to higher values.

Those poor men and clerks who have to live by daily toil, instead of being the first, should be the last to be called upon to suffer thus for Almanac and Exchange irregularities—or, in common fairness, "they who least can bear it," should not suffer proportionately more than the Directors, Shareholders and Officers.

This Almanac inflicted injustice not only affects the millions of Railway Employees in the World (U.S.A. 1,200,000, U.K. 600,000, etc.), but almost all classes of business and workers in every trade.

For instance, in 1905 our typical Colliery, per page 37, owing to Easter falling in April

shows only £3,600 earnings, whereas May shows £4,600 when that heavier wages have to be provided, whilst £1,000 less is coming in from the £3,600 April sales, as customers have monthly accounts; when five weekly pay days occur in the month after one of light earnings the pinch is felt, as experience proved to me when a Colliery Manager.

Similarly the small shopkeepers are inconvenienced and run risk of difficulties when having to meet heavy months' bills during months with only four week-ends, *e.g.*, January, 1903, shows £46·3, whilst February only brings in £40·0 and December £38·0, when Almanac time is computed on regular weekly earnings.

Similar difficulties and waste labours are constantly recurring in almost all businesses, and unless we simplify our Almanac will become aggravated, as the stress of our growing business activities makes more apparent the varying periods of earning and expenditure now caused by the changing work-days in months, quarters, half-years and years.

We are all inconvenienced by the irregular months in which 5 Saturdays necessitate weekly payments for groceries, rent, etc.—months of 4 weeks would be far easier and fairer to everyone.

There are so many similar inconveniences, which the "Rational Almanac" would obviate, in better fixing fortnightly and monthly fairs, meetings, etc., that they will be naturally suggested to thoughtful persons, therefore there is no need to labour examples; I will therefore only refer to the case of our domestic servants, which indirectly affects the convenience of all classes—all employers of household servants, the servants themselves, and their relatives, numbering millions of our toilers, are thereby affected.—Say a maid is allowed out on Sunday afternoons on alternate weeks, whilst on the intervening Sundays she goes out at nights. Whenever she is invited out to tea a few weeks ahead, or the mistress who only keeps one maid desires to ask friends to tea, all are bothered to work out whether the maid is due in or out on the particular date, whereas by the "Rational Calendar" they would instantly know that, if the afternoon dates were 1st and 15th whilst the evening dates were the 8th and 22nd of each month.

THE THIRD STEP.—*Re-arrange the months into 13 months of 4 weeks each, for greater convenience, by inserting a Mid-Summer month.*

I would therefore suggest that we should, *from Christmas*, say 1916, ignore the anomalous months of the old Calendar and arrange the 1,917th and future Civil years into 13 *equal months* of 4 weeks each, which, with the Christmas week of 8 days as explained, would evenly divide the year into 52 weeks, in the most convenient way from January 1st, 1917.

WE SHOULD THEN SECURE THE IMMENSE ADVANTAGE OF HAVING ALL THE MONTHS ALIKE, BOTH IN THEIR ORDER OF WEEK-DAYS AND THEIR TOTAL NUMBER OF 4 WEEKS AND 28 DAYS.

Then week-days would always fall on the same dates in every month and throughout every year as shown by the proposed *fixed* Calendar on the front cover. Thus we could gain

A PERMANENT MONTHLY and YEARLY CALENDAR.

Sundays	being on	1,	8, 15, 22	of	each month.
Mondays	,,	,, 2,	9, 16, 23	,,	,,
Tuesdays	,,	,, 3,	10, 17, 24	,,	,,
Wednesdays	,,	,, 4,	11, 18, 25	,,	,,
Thursdays	,,	,, 5,	12, 19, 26	,,	,,
Fridays	,,	,, 6,	13, 20, 27	,,	,,
Saturdays	,,	,, 7,	14, 21, 28	,,	,,

It would be quite easy then for everybody to have the Calendar clearly in their minds, and know at a thought exactly when every date fell, whilst the average person could then readily find mentally the exact number of days between any two dates within a year without even referring to an Almanac. The facilities and far-reaching advantages which would accrue from this simplification cannot be estimated, now that we have been so long inured to the irksome anomalies of the present Calendar.

The Parliamentary Sessions, Law Terms, School and College Terms, and all similar periods would be simple to determine, and always fixed and uniform in their duration.

The change would give a *reliable basis of comparison* weekly, monthly, quarterly, half-yearly, and yearly with previous weeks, months and years for revenue, expenditure, taxation, imports, exports, railway, shipping and all other like earnings and expenditure. It would simplify all statistical information required for progressive, business, national, and international purposes. This cannot be done now without much trouble owing to the dates of Easter, Whitsuntide, etc., varying, and the useless yearly change of week-day dates aggravated by the present unequal months.

Business monthly accounts to customers would then be *proportionate* to wages and other expenses incurred. Next year in the ordinary course, Firms will send out February accounts (4 weeks), the money for which comes from customers during March which will have 5 Saturday "pay-days," hence it is possible that fact may cause Firms with little capital to be "pulled up" at their Bankers.

Wholesale Firms usually draw Bills at a month (Calendar) upon the retail trade as supplied; sometimes the Tradesman gets the turnover of 5 week-ends to pay with, at others only 4—then he is "squeezed," whereas the 4-weekly month would work smoothly. Weekly payments of 5 per month or 53 per year would under the proposed Calendar be impossible, and all the waste labour of the adjustment of such accounts would be saved. Stock exchange and other settlements could be in even fortnights throughout the year instead of being disturbed as now by periodical 16 and 17 days settlements. It seems to me that everybody would benefit by the change when once made, and that it would make future progress easier to the common people, as, for

instance, if Old Age Pensions come into force weekly and monthly payments would be equitable, and if any system of contribution for earlier years was decided upon, the accounts would be far more easily kept, as the secretaries of Railway, etc., Superannuation accounts can readily testify.

During the last few years it has been my lot to lead the movement for the Reform of our Railway and other Superannuation Funds on an easy equitable basis, in order to benefit the workers and improve the relations of employers and employees, whilst at the same time laying financially sound, just and permanent foundations for a truly national scheme of OLD AGE PENSIONS, which can certainly be established upon contributions and principles fair to all classes of the community (including Friendly Societies, Pension Funds and other agencies of thrift we should wisely encourage), as will be seen when my scheme is published during the coming Winter.

Full investigation during the last 8 years into one of the largest of these Funds has convinced me that such a desirable scheme is practicable, and though I do not say that it is dependent upon Almanac Reform, I emphasize the fact that it would be greatly facilitated by the simple Almanac of months of 4 weeks herein proposed, as then all payments, suitable to every income, whether made by weekly, fortnightly, monthly, quarterly, half-yearly, or yearly instalments would be equitable, whereas they are not so now—neither are they even as then would be the case.

For instance, Managers of Pension Funds realise the great importance of the difference accumulated by interest on payments made quarterly when compared with interest paid monthly. A similar difference accrues between interests on monthly and weekly payments, and though that may individually appear small, it becomes of considerable importance when applied to the total payments of millions of working people.

I have already shown on pages 31 and 37 the disparity between February and other monthly payments. A corresponding difference arises between the weekly payments payable to a Pension Fund by weekly wage earners when compared with the monthly payments of salaried clerks, officials, sailors, domestic servants, etc., therefore, to ensure combined support and mutual interest it is highly desirable that all sense of anyone getting an unfair advantage should be cleared away.

With the easily applied Almanac and scheme I suggest, the weekly payer would not be pauperised, his thrifty habits would be encouraged, and he would be as fairly treated as the monthly paying official or the half-yearly dividend contributor.

Already the Belgian Government is arranging such payments for the revised housing scheme for the poor, whilst our Parliament has now considered a bill to enable small householders to acquire their houses by such repayments.

Name of the proposed New Month.

February, with 28 days—a complete period of 4 weeks—seems decidedly the model month upon which to reconstruct the Calendar. It was the last month added to the Roman Calendar; and its name signifying "to purify" or "cleanse" is an appropriate foundation, for a glance at the Calendar shows the February perfect weekday comparison with the first 28 days of March.

To adopt 13 months would require the addition of a new month, which I suggest should come between June and July (as on the Proposed Calendar), because that position would cause the least disturbance of the present monthly arrangement,—indeed a careful comparison of the two Calendars will show that the adjustment would hardly be appreciably felt when thus graduated from Midsummer, as 15 days would be the extreme limit of the monthly change in name only. Very little inconvenience could arise.

What little difficulty might at first appear in the way of calculating 13 monthly charges to Yearly Amounts, or Yearly Rents, etc., to Monthly Payments, can be dispelled by either learning a 13-times Table or more easily carrying in the pockets of such as need them a card with the Multiplication and Division Tables for the three-figure-values shown thereon, as per the Tables on pages 50 and 51, whilst an easy means for adjusting Birthday and other fixed dates can be found in the "Combined Calendar for transferring the "Dates between the Present and Proposed "Almanacs," as shewn facing the Title page.

This extra month might be called "Sol" (the Sun)—the Sunniest month—as suitable, if placed as suggested between June and July, and so let the Sun be recognised in the naming of the months of the year he appears to control. Then the introduction of the new month "Sol" might record the establishment of the equalized months on the basis of the Earth's rotation round the Sun—*the pivot of the year*. The word "Sol" seems most appropriate, because it is a root-word in nearly all the widely spoken languages, and has its equivalent in all (an important factor since the consent of civilized nations would be required), whilst it has the distinct advantage of brevity, and might fairly be regarded as most likely to be universally accepted, because it is quite free from the risk of exciting any international jealousies or religious fanaticism

Other names might be suggested such as "Sum" (Summer), "Tredecim" (13th month), "Quaset" (4 periods of 7 days), "Newmonth," etc., as public opinion might decide.—Let the papers have a competition for the name if they like. I would advocate the most suitable name, for I am in no sense wedded to "Sol"—that is merely named as what appeared best at first sight, and because something had to be found to fill up the blank.

TABLE Showing the PRODUCTS of NUMBERS x 13.

Ex "Cotsworth's Direct Calculator O."

13	0	100	200	300	400	500	600	700	800	900	Tens & Units
0	...	13	26	39	52	65	78	91	104	117	00
1	...	13	26	39	52	65	78	91	104	117	13
2	...	13	26	39	52	65	78	91	104	117	26
3	...	13	26	39	52	65	78	91	104	117	39
4	...	13	26	39	52	65	78	91	104	117	52
5	...	13	26	39	52	65	78	91	104	117	65
6	...	13	26	39	52	65	78	91	104	117	78
7	...	13	26	39	52	65	78	91	104	117	91
8	1	14	27	40	53	66	79	92	105	118	04
9	1	14	27	40	53	66	79	92	105	118	17
10	1	14	27	40	53	66	79	92	105	118	30
11	1	14	27	40	53	66	79	92	105	118	43
12	1	14	27	40	53	66	79	92	105	118	56
13	1	14	27	40	53	66	79	92	105	118	69
14	1	14	27	40	53	66	79	92	105	118	82
15	1	14	27	40	53	66	79	92	105	118	95
16	2	15	28	41	54	67	80	93	106	119	08
17	2	15	28	41	54	67	80	93	106	119	21
18	2	15	28	41	54	67	80	93	106	119	34
19	2	15	28	41	54	67	80	93	106	119	47
20	2	15	28	41	54	67	80	93	106	119	60
21	2	15	28	41	54	67	80	93	106	119	73
22	2	15	28	41	54	67	80	93	106	119	86
23	2	15	28	41	54	67	80	93	106	119	99
24	3	16	29	42	55	68	81	94	107	120	12
25	3	16	29	42	55	68	81	94	107	120	25
26	3	16	29	42	55	68	81	94	107	120	38
27	3	16	29	42	55	68	81	94	107	120	51
28	3	16	29	42	55	68	81	94	107	120	64
29	3	16	29	42	55	68	81	94	107	120	77
30	3	16	29	42	55	68	81	94	107	120	90
31	4	17	30	43	56	69	82	95	108	121	03
32	4	17	30	43	56	69	82	95	108	121	16
33	4	17	30	43	56	69	82	95	108	121	29
34	4	17	30	43	56	69	82	95	108	121	42
35	4	17	30	43	56	69	82	95	108	121	55
36	4	17	30	43	56	69	82	95	108	121	68
37	4	17	30	43	56	69	82	95	108	121	81
38	4	17	30	43	56	69	82	95	108	121	94
39	5	18	31	44	57	70	83	96	109	122	07
40	5	18	31	44	57	70	83	96	109	122	20
41	5	18	31	44	57	70	83	96	109	122	33
42	5	18	31	44	57	70	83	96	109	122	46
43	5	18	31	44	57	70	83	96	109	122	59
44	5	18	31	44	57	70	83	96	109	122	72
45	5	18	31	44	57	70	83	96	109	122	85
46	5	18	31	44	57	70	83	96	109	122	98
47	6	19	32	45	58	71	84	97	110	123	11
48	6	19	32	45	58	71	84	97	110	123	24
49	6	19	32	45	58	71	84	97	110	123	37
50	6	19	32	45	58	71	84	97	110	123	50
51	6	19	32	45	58	71	84	97	110	123	63
52	6	19	32	45	58	71	84	97	110	123	76
53	6	19	32	45	58	71	84	97	110	123	89
54	7	20	33	46	59	72	85	98	111	124	02
55	7	20	33	46	59	72	85	98	111	124	15
56	7	20	33	46	59	72	85	98	111	124	28
57	7	20	33	46	59	72	85	98	111	124	41
58	7	20	33	46	59	72	85	98	111	124	54
59	7	20	33	46	59	72	85	98	111	124	67
60	7	20	33	46	59	72	85	98	111	124	80
61	7	20	33	46	59	72	85	98	111	124	93
62	8	21	34	47	60	73	86	99	112	125	06
63	8	21	34	47	60	73	86	99	112	125	19
64	8	21	34	47	60	73	86	99	112	125	32
65	8	21	34	47	60	73	86	99	112	125	45
66	8	21	34	47	60	73	86	99	112	125	58
67	8	21	34	47	60	73	86	99	112	125	71
68	8	21	34	47	60	73	86	99	112	125	84
69	8	21	34	47	60	73	86	99	112	125	97
70	9	22	35	48	61	74	87	100	113	126	10
71	9	22	35	48	61	74	87	100	113	126	23
72	9	22	35	48	61	74	87	100	113	126	36
73	9	22	35	48	61	74	87	100	113	126	49
74	9	22	35	48	61	74	87	100	113	126	62
75	9	22	35	48	61	74	87	100	113	126	75
76	9	22	35	48	61	74	87	100	113	126	88
77	10	23	36	49	62	75	88	101	114	127	01
78	10	23	36	49	62	75	88	101	114	127	14
79	10	23	36	49	62	75	88	101	114	127	27
80	10	23	36	49	62	75	88	101	114	127	40
81	10	23	36	49	62	75	88	101	114	127	53
82	10	23	36	49	62	75	88	101	114	127	66
83	10	23	36	49	62	75	88	101	114	127	79
84	10	23	36	49	62	75	88	101	114	127	92
85	11	24	37	50	63	76	89	102	115	128	05
86	11	24	37	50	63	76	89	102	115	128	18
87	11	24	37	50	63	76	89	102	115	128	31
88	11	24	37	50	63	76	89	102	115	128	44
89	11	24	37	50	63	76	89	102	115	128	57
90	11	24	37	50	63	76	89	102	115	128	70
91	11	24	37	50	63	76	89	102	115	128	83
92	11	24	37	50	63	76	89	102	115	128	96
93	12	25	38	51	64	77	90	103	116	129	09
94	12	25	38	51	64	77	90	103	116	129	22
95	12	25	38	51	64	77	90	103	116	129	35
96	12	25	38	51	64	77	90	103	116	129	48
97	12	25	38	51	64	77	90	103	116	129	61
98	12	25	38	51	64	77	90	103	116	129	74
99	12	25	38	51	64	77	90	103	116	129	87
13	Log ...		1139434		Sq. Root..		3 6055513		Reciprocal		076923077
	Cube ...		2 197		Cube Root		2 3513347		x 3·14159 &c.		40 8407033

e.g.—999 × 13 = 12987

899 × 13 = 11687

999,899 × 13 = 13010387

TABLE Showing the QUOTIENTS of NUMBERS DIVIDED by 13.

Specimen of Cotsworth's Division Tables for Percentages, Pro-Rating, etc.

No.	0	100	200	300	400	500	600	700	800	900	No. x 1,000
0		7·69	15·38	23·08	30·77	38·46	46·15	53·85	61·54	69·23	0
1	·08	7·77	15·46	23·15	30·85	38·54	46·23	53·92	61·62	69·31	1000 76·92
2	·15	7·85	15·54	23·23	30·92	38·62	46·31	54·	61·69	69·38	2000 153·85
3	·23	7·92	15·62	23·31	31·	38·69	46·38	54·08	61·77	69·46	3000 230·77
4	·31	8·	15·69	23·38	31·08	38·77	46·46	54·15	61·85	69·54	4000 307·69
5	·38	8·08	15·77	23·46	31·15	38·85	46·54	54·23	61·92	69·62	5000 384·62
6	·46	8·15	15·85	23·54	31·23	38·92	46·62	54·31	62·	69·69	6000 461·54
7	·54	8·23	15·92	23·62	31·31	39·	46·69	54·38	62·08	69·77	7000 538·46
8	·62	8·31	16·	23·69	31·38	39·08	46·77	54·46	62·15	69·85	8000 615·38
9	·69	8·38	16·08	23·77	31·46	39·15	46·85	54·54	62·23	69·92	9000 692·31
10	·77	8·46	16·15	23·85	31·54	39·23	46·92	54·62	62·31	70·	10000 769·23
11	·85	8·54	16·23	23·92	31·62	39·31	47·	54·69	62·38	70·08	11000 846·15
12	·92	8·62	16·31	24·	31·69	39·38	47·08	54·77	62·46	70·15	12000 923·08
13	1·	8·69	16·38	24·08	31·77	39·46	47·15	54·85	62·54	70·23	13000 1000·00
14	1·08	8·77	16·46	24·15	31·85	39·54	47·23	54·92	62·62	70·31	14000 1076·92
15	1·15	8·85	16·54	24·23	31·92	39·62	47·31	55·	62·69	70·38	15000 1153·85
16	1·23	8·92	16·62	24·31	32·	39·69	47·38	55·08	62·77	70·46	16000 1230·77
17	1·31	9·	16·69	24·38	32·08	39·77	47·46	55·15	62·85	70·54	17000 1307·69
18	1·38	9·08	16·77	24·46	32·15	39·85	47·54	55·23	62·92	70·62	18000 1384·62
19	1·46	9·15	16·85	24·54	32·23	39·92	47·62	55·31	63·	70·69	19000 1461·54
20	1·54	9·23	16·92	24·62	32·31	40·	47·69	55·38	63·08	70·77	20000 1538·46
21	1·62	9·31	17·	24·69	32·38	40·08	47·77	55·46	63·15	70·85	21000 1615·38
22	1·69	9·38	17·08	24·77	32·46	40·15	47·85	55·54	63·23	70·92	22000 1692·31
23	1·77	9·46	17·15	24·85	32·54	40·23	47·92	55·62	63·31	71·	23000 1769·23
24	1·85	9·54	17·23	24·92	32·62	40·31	48·	55·69	63·38	71·08	24000 1846·15
25	1·92	9·62	17·31	25·	32·69	40·38	48·08	55·77	63·46	71·15	25000 1923·08
26	2·	9·69	17·38	25·08	32·77	40·46	48·15	55·85	63·54	71·23	26000 2000·00
27	2·08	9·77	17·46	25·15	32·85	40·54	48·23	55·92	63·62	71·31	27000 2076·92
28	2·15	9·85	17·54	25·23	32·92	40·62	48·31	56·	63·69	71·38	28000 2153·85
29	2·23	9·92	17·62	25·31	33·	40·69	48·38	56·08	63·77	71·46	29000 2230·77
30	2·31	10·	17·69	25·38	33·08	40·77	48·46	56·15	63·85	71·54	30000 2307·69
31	2·38	10·08	17·77	25·46	33·15	40·85	48·54	56·23	63·92	71·62	31000 2384·62
32	2·46	10·15	17·85	25·54	33·23	40·92	48·62	56·31	64·	71·69	32000 2461·54
33	2·54	10·23	17·92	25·62	33·31	41·	48·69	56·38	64·08	71·77	33000 2538·46
34	2·62	10·31	18·	25·69	33·38	41·08	48·77	56·46	64·15	71·85	34000 2615·38
35	2·69	10·38	18·08	25·77	33·46	41·15	48·85	56·54	64·23	71·92	35000 2692·31
36	2·77	10·46	18·15	25·85	33·54	41·23	48·92	56·62	64·31	72·	36000 2769·23
37	2·85	10·54	18·23	25·92	33·62	41·31	49·	56·69	64·38	72·08	37000 2846·15
38	2·92	10·62	18·31	26·	33·69	41·38	49·08	56·77	64·46	72·15	38000 2923·08
39	3·	10·69	18·38	26·08	33·77	41·46	49·15	56·85	64·54	72·23	39000 3000·00
40	3·08	10·77	18·46	26·15	33·85	41·54	49·23	56·92	64·62	72·31	40000 3076·92
41	3·15	10·85	18·54	26·23	33·92	41·62	49·31	57·	64·69	72·38	41000 3153·85
42	3·23	10·92	18·62	26·31	34·	41·69	49·38	57·08	64·77	72·46	42000 3230·77
43	3·31	11·	18·69	26·38	34·08	41·77	49·46	57·15	64·85	72·54	43000 3307·69
44	3·38	11·08	18·77	26·46	34·15	41·85	49·54	57·23	64·92	72·62	44000 3384·62
45	3·46	11·15	18·85	26·54	34·23	41·92	49·62	57·31	65·	72·69	45000 3461·54
46	3·54	11·23	18·92	26·62	34·31	42·	49·69	57·38	65·08	72·77	46000 3538·46
47	3·62	11·31	19·	26·69	34·38	42·08	49·77	57·46	65·15	72·85	47000 3615·38
48	3·69	11·38	19·08	26·77	34·46	42·15	49·85	57·54	65·23	72·92	48000 3692·31
49	3·77	11·46	19·15	26·85	34·54	42·23	49·92	57·62	65·31	73·	49000 3769·23
50	3·85	11·54	19·23	26·92	34·62	42·31	50·	57·69	65·38	73·08	50000 3846·15
51	3·92	11·62	19·31	27·	34·69	42·38	50·08	57·77	65·46	73·15	51000 3923·08
52	4·	11·69	19·38	27·08	34·77	42·46	50·15	57·85	65·54	73·23	52000 4000·00
53	4·08	11·77	19·46	27·15	34·85	42·54	50·23	57·92	65·62	73·31	53000 4076·92
54	4·15	11·85	19·54	27·23	34·92	42·62	50·31	58·	65·69	73·38	54000 4153·85
55	4·23	11·92	19·62	27·31	35·	42·69	50·38	58·08	65·77	73·46	55000 4230·77
56	4·31	12·	19·69	27·38	35·08	42·77	50·46	58·15	65·85	73·54	56000 4307·69
57	4·38	12·08	19·77	27·46	35·15	42·85	50·54	58·23	65·92	73·62	57000 4384·62
58	4·46	12·15	19·85	27·54	35·23	42·92	50·62	58·31	66·	73·69	58000 4461·54
59	4·54	12·23	19·92	27·62	35·31	43·	50·69	58·38	66·08	73·77	59000 4538·46
60	4·62	12·31	20·	27·69	35·38	43·08	50·77	58·46	66·15	73·85	60000 4615·38
61	4·69	12·38	20·08	27·77	35·46	43·15	50·85	58·54	66·23	73·92	61000 4692·31
62	4·77	12·46	20·15	27·85	35·54	43·23	50·92	58·62	66·31	74·	62000 4769·23
63	4·85	12·54	20·23	27·92	35·62	43·31	51·	58·69	66·38	74·08	63000 4846·15
64	4·92	12·62	20·31	28·	35·69	43·38	51·08	58·77	66·46	74·15	64000 4923·08
65	5·	12·69	20·38	28·08	35·77	43·46	51·15	58·85	66·54	74·23	65000 5000·00
66	5·08	12·77	20·46	28·15	35·85	43·54	51·23	58·92	66·62	74·31	66000 5076·92
67	5·15	12·85	20·54	28·23	35·92	43·62	51·31	59·	66·69	74·38	67000 5153·85
68	5·23	12·92	20·62	28·31	36·	43·69	51·38	59·08	66·77	74·46	68000 5230·77
69	5·31	13·	20·69	28·38	36·08	43·77	51·46	59·15	66·85	74·54	69000 5307·69
70	5·38	13·08	20·77	28·46	36·15	43·85	51·54	59·23	66·92	74·62	70000 5384·62
71	5·46	13·15	20·85	28·54	36·23	43·92	51·62	59·31	67·	74·69	71000 5461·54
72	5·54	13·23	20·92	28·62	36·31	44·	51·69	59·38	67·08	74·77	72000 5538·46
73	5·62	13·31	21·	28·69	36·38	44·08	51·77	59·46	67·15	74·85	73000 5615·38
74	5·69	13·38	21·08	28·77	36·46	44·15	51·85	59·54	67·23	74·92	74000 5692·31
75	5·77	13·46	21·15	28·85	36·54	44·23	51·92	59·62	67·31	75·	75000 5769·23
76	5·85	13·54	21·23	28·92	36·62	44·31	52·	59·69	67·38	75·08	76000 5846·15
77	5·92	13·62	21·31	29·	36·69	44·38	52·08	59·77	67·46	75·15	77000 5923·08
78	6·	13·69	21·38	29·08	36·77	44·46	52·15	59·85	67·54	75·23	78000 6000·00
79	6·08	13·77	21·46	29·15	36·85	44·54	52·23	59·92	67·62	75·31	79000 6076·92
80	6·15	13·85	21·54	29·23	36·92	44·62	52·31	60·	67·69	75·38	80000 6153·85
81	6·23	13·92	21·62	29·31	37·	44·69	52·38	60·08	67·77	75·46	81000 6230·77
82	6·31	14·	21·69	29·38	37·08	44·77	52·46	60·15	67·85	75·54	82000 6307·69
83	6·38	14·08	21·77	29·46	37·15	44·85	52·54	60·23	67·92	75·62	83000 6384·62
84	6·46	14·15	21·85	29·54	37·23	44·92	52·62	60·31	68·	75·69	84000 6461·54
85	6·54	14·23	21·92	29·62	37·31	45·	52·69	60·38	68·08	75·77	85000 6538·46
86	6·62	14·31	22·	29·69	37·38	45·08	52·77	60·46	68·15	75·85	86000 6615·38
87	6·69	14·38	22·08	29·77	37·46	45·15	52·85	60·54	68·23	75·92	87000 6692·31
88	6·77	14·46	22·15	29·85	37·54	45·23	52·92	60·62	68·31	76·	88000 6769·23
89	6·85	14·54	22·23	29·92	37·62	45·31	53·	60·69	68·38	76·08	89000 6846·15
90	6·92	14·62	22·31	30·	37·69	45·38	53·08	60·77	68·46	76·15	90000 6923·08
91	7·	14·69	22·38	30·08	37·77	45·46	53·15	60·85	68·54	76·23	91000 7000·00
92	7·08	14·77	22·46	30·15	37·85	45·54	53·23	60·92	68·62	76·31	92000 7076·92
93	7·15	14·85	22·54	30·23	37·92	45·62	53·31	61·	68·69	76·38	93000 7153·85
94	7·23	14·92	22·62	30·31	38·	45·69	53·38	61·08	68·77	76·46	94000 7230·77
95	7·31	15·	22·69	30·38	38·08	45·77	53·46	61·15	68·85	76·54	95000 7307·69
96	7·38	15·08	22·77	30·46	38·15	45·85	53·54	61·23	68·92	76·62	96000 7384·62
97	7·46	15·15	22·85	30·54	38·23	45·92	53·62	61·31	69·	76·69	97000 7461·54
98	7·54	15·23	22·92	30·62	38·31	46·	53·69	61·38	69·08	76·77	98000 7538·46
99	7·62	15·31	23·	30·69	38·38	46·08	53·77	61·46	69·15	76·85	99000 7615·38
											100000 7692·31

Per Year. Months.

e.g., 100,999 ÷ 13 = $\begin{matrix} 7692\ 31 \\ 76\cdot85 \end{matrix}$ = 7769·16 per month.

From positions 100,000 and 999.

I would rather suggest that *the months should be known more by numbers with a view to making them universal, for all nations use the Arabic numerals*, besides numbers are far clearer and much more quickly written than names. This is becoming more recognised by the community, whose tendency is increasingly to write 28/2/1902 in preference to 28th February, 1902.

[The names of the present week-days are also too long, and their contracted single initials are confusing with S for both Saturday and Sunday, and T for Tuesday and Thursday. These names after the old-pagan-god-worship days are not abreast of our times. To my mind it would be far simpler and more business-like to name the week-days A, B, C, D, E, F, and G respectively, as those letters are common to nearly all countries. They were so used in the first Almanacs and so continued beyond Pope Gregory's time, until the British Reform of the Almanac in 1752, as shown on page 25. It is to be regretted that they were departed from. However, this is a minor matter.]

Again, the present *oddly varying days* terminating the months *destroy that simplicity of arrangement which should be the governing factor in a Calendar for the people.* Hundreds of times in a year most of us have to needlessly refer to the Almanac, whereas the plain and easy *four-weekly arrangement of months and fixed Festivals* would speedily become distinct and clear to all our minds without the needless trouble of constant reference.

The few remaining superstitious folk still afraid of the number 13 may reasonably be ignored, as their case is already undermined by the fact that 13 weeks now form each of the main divisions as Quarters of the year.

Proposal to Date this Almanac Reform from Christmas, 1916.

1. To place these proposals on a practical basis, some approximate Year within a reasonable time must be named as a date upon which the change might with advantage take effect. —The Year 2000 would be ideal as a distinctive and easily remembered number, but few people would work for such a distant reform, when they knew that they would never live to benefit by it.—None of the Almanac Reforms were delayed for cental dates, but were carried through when seen desirable, *i.e.:* Julius Cæsar's Reform, 45 B.C.; Pope Gregory's Reform, 1582; English Calendar Reform, 1752.

Any attempt to forthwith amend the Almanac next year or the year following would prove impracticable; besides, the Nautical Almanacs and other authentic documents are worked out and printed for several years in advance.

Experience proves that all reforms dependent upon the free will of peoples enjoying Free Institutions require a period of about 10 years during which the majority can be brought, by wisely organised and persistent efforts, to

realize the advantages of the proposed Reforms, and vote in their favour.—As Almanac Reform, to be complete, also requires united International action, a longer period may be required; but in view of the progressive age in which we live, when thoughtful people so readily appreciate the advantages which would result from these proposals, the interval of 12 years (1904 to 1916) should be amply sufficient, if the enlightened newspaper and magazine editors and leaders of public opinion fairly consider and persistently put forward the merits of this suggested reform by the best means.

The Year 1916 is therefore named as most convenient and within measurable distance of accomplishment by mutual effort, though the fact of the present style Christmas Day falling on Mondays about every 6 years will afford recurring facilities for the change being easily made, as if we begin when Christmas Day falls on Monday, by simply calling it Christmas Day, and then defer the Monday name till the following day, that change could be almost imperceptibly made.

Peace and Goodwill dominate our thoughts at Christmas, when we call to mind the march of the years; and as the International Peace Society, which has exerted such beneficial influence for human happiness, was first established by the French at Paris in 1816, the centenary of that year could be fittingly commemorated by amending the Calendar in 1916.

But, apart from that, the year 1816 seems eminently entitled to be conspicuously commemorated as the year during which most substantial progress was made towards true advancement for the well-being and happiness of humanity.

The unprecedented terrors and desolations of the wars ended in 1815 had given place to assured Peace, which was then so highly cherished that the Arts of Peace received such stimulus (as the following record will show) that no other year equals it in the growth of those reciprocal connecting links of Commerce, Industrial Progress, Scientific Thought and Investigation. These encouraged mutual interest and led to that friendly intercourse between Nations which forms the best guarantee of lasting Peace, as upon that the true prosperity and happiness of all nationalities so very largely depend.

Some of the GREAT EVENTS and INVENTIONS of 1816.

1. The CONGRESS OF VIENNA then finally settled the Political Affairs of Europe, after Napoleon's overthrow, and so prepared the way for international friendship and intercourse.
2. George Stephenson had just invented the Miners' Safety Lamp and the Steam Blast, which latter, with other mechanical improvements, he was applying in **1816** towards the development of the first Railway LOCOMOTIVE.

3. Iron Ships were first invented, and Steam was being applied to Navigation—thus originating the Steamship Service for International intercourse and Trade.

4. The Electric Telegraph, with Index and Clockwork, was invented by Sir Francis Ronalds.

5. The first Savings Banks in England and the United States were then established.

6. The Albion Printing Press was introduced.

7. Stereo Plates were first invented for Book and Newspaper Printing.

8. Cheap Newspapers (encouraged to vigorous efforts by the preceding year's eager demand of the people for news of the War) began to exert great influence amongst the people, by advocating Reforms, etc. They thus attained to the large circulations which enabled them to reduce the cost to the useful "1d. Daily" and secure wider patronage.

9. Lithography was brought into practical use.

10. Gas-Lighting became general in Large Towns.

11. The Foundations of the great German Empire were laid in 1816 by the first assembly of the Diet of the Germanic Confederation and the Proclamation of William I. as King.

12. The United States of America attained to International Power after their far-seeing President Monroe was first elected in 1816. Their Navy originated in that year with the building of the "Washington"; their Protective Policy was begun by the Tariff then imposed; whilst the growth and consolidation of the States then begun by the admission of Indiana, etc., into the Union, led to that peaceful expansion and material development which has been almost continuous ever since.

13. The nations united for the first time in the interest of Humanity, established the International Peace Society to further the greatest international blessing of Peace and Goodwill, by the rational means of Arbitration.

More might be added, but the above sufficiently evidence 1816 as the year of unparalleled quiet and solid progress towards enhancing human happiness and welfare, therefore its Centenary might well be celebrated by Almanac Reform, which would so beneficially facilitate the conveniences of National and International Life throughout every section of humanity over the wide world.

Even if only the "First Step" be taken *to secure uniformity of week-days throughout the year*, the 1917 Almanac would become so far permanently uniform for future years.

If my whole scheme be acted upon—

i. *Lady Day*, now March 25th (Quarter Day), would always fall on Saturday (its most convenient day) and be the last day in the revised March (3rd month). That month-end would thus be far more suitable than now for the settlement of rents, leases, etc.

ii. *Easter Sunday* would always be the 1st day of the revised May, when days are longer and brighter.

iii. Whit Sunday would always be on the 22nd of the revised June, unless it be preferably removed a week later, and fixed on the "1st of Sol," when brighter weather and longer daylight prevail. This would also have the advantage of spreading the holidays to the glorious Mid-Summer.

iv. August Bank Holiday would always be the 2nd day of the revised August.

v. Advent Sunday would always be the 1st day of the revised December.

vi. Christmas Day would then always be in its happiest position for that popular Holiday to be unbroken for 3½ days from Saturday noon to Boxing night.

vii. The 1st day of the week would always be the 1st of the New Year, as well as of all future months.

viii. Months, Quarters, Half-years and Years would all be equated and end on Saturdays (complete weeks), so immensely simplifying and facilitating the keeping of accounts; and as Easter, etc., would always fall in the same week the comparison of all incomes, expenditures, railway and business earnings, etc., would be perfectly fair year by year, and far simpler.

ix. All Almanac, etc., times for earnings and expenditures would be equalized, whilst the computation of interest, odd periods for rents, and very many other at present tedious processes would be greatly simplified, to the saving of useless worry, annoyance and labour.

x. Days of the month would always be alike, as on the "Proposed future style Calendar" shown on the front cover.

Many other advantages would result from the simplicity of the suggested Almanac—as, for instance, Friendly Societies, Club Meetings, Directors' Meetings, alternate duties of night and day men (now arranged fortnightly) would always fall on the same days of the month.

WHY CHANGE AT CHRISTMAS, 1916?

Such a change would not alter anyone's computation of age, the length of the year, nor our records of time, and as only the shadowiest sentiment could be raised against that course, I think we should take it and secure in the near future the many obvious advantages already indicated.

It is quite impossible at first to realize or estimate the many and varied benefits to be derived in everyday life from a "Rational Almanac."

I have already stated some of the reasons why Christmas, 1916, seems the best time that we shall have for many generations to make the change. A long time must elapse before so many favourable factors again combine to give that continuity and easy transition which are so eminently desirable. Among such factors are:—

(*a*) Christmas Day follows the Sunday, thus falling in its best possible position for the convenience of everybody, to make the best of the continuous 3½ days' holiday (Saturday afternoon, Sunday, Christmas Day, and Boxing Day), beyond which Tuesday, Wednesday, Thursday, Friday and Saturday would complete the year, and always bring Sunday as New Year's Day.

(*b*) Then the Almanac for 1917, etc., might become a permanent one to facilitate the change and regulate the position of the fixed Feasts and Holidays.

Easter Sunday is dated for **APRIL** 23rd in the present style Calendar for **1916**; and as much better weather is then likely to prevail than rational expectation could lead us to anticipate for Easter Sunday of 1913, which falls on **MARCH** 23rd when the Equinoxial gales are due to blow, I would suggest that April 23rd be taken as the fixed date for Easter, so that the toilers in our large towns may have better enjoyment of this their longest summer holiday (Good Friday, Saturday, Sunday and Easter Monday) in more seasonable weather.

If, however, the majority prefer to fix Easter Sunday *midway between the present range of* 36 *dates, then let it be fixed on April* 8*th*, where it falls in 1917 according to the present style. —Only let it be permanently fixed for public convenience, on the best possible date, bearing in mind the great advantage to be gained for the masses of the people by fixing Easter near the better holiday weather prevailing in May.

There is no special virtue or Christian advantage in drifting with the Equinoxial moons, which do not locate the true anniversary of Christ s death.

Although the fixing of Easter in the position it occupies in the year 1916 would have many advantages, and might tend to a more Christian observance of the Festival, I do not desire to give undue weight thereto, as I hold its time should be fixed for the best welfare of the people. If, therefore, it was found,

upon enquiry from the main parties interested, that it should be fixed a fortnight earlier or later, my main object would be accomplished so long as the principle of its *fixity* could replace the present confusing *movability* of its date, still I would prefer on the ground of public convenience to fix it about the 1st of May. I merely suggested the placing of it there because I had to indicate something definite, and, on the whole, that date seems best to my mind, but I readily admit that it is possible that the majority of the people might prefer another date; if so, by all means let them have it on the most desirable day they can fix.

The present long-continued, cumbersome Almanac arrangement has lived on that natural conservatism which almost imperceptibly, yet implicitly, leads children to accept the methods of their parents as unquestionably the best, and in that way has been handed down from generation to generation.

The old fixed Whitsun term on May 15th came down to us in that way, as also did the Ancient Beltane Festivals on 1st May and 1st November, which were used to denote by bonfires on the hills, the half-year dates of the Ancient Agricultural Year, dating back to the Primeval Ages of Baal or Sun-worship through fire.

Much that primeval men believed in, respecting the occult influences of the moon, we should now-a-days call "moonshine," despite the fact (which few people know) that astrological and superstitious nonsense continued to be almost the leading features of the Calendar till 1828, and even when then left out, most of the people clamoured so furiously for their mysterious old bogies that nearly the whole of the first issues of the purer Almanac were returned to the publishers, who were thus compelled to reprint the Almanac to include the astrological rubbish—despite the fact that then the British Almanac was practically a monopoly, and others scarcely obtainable.

Let that ancient institution, the "moon," be relieved of its futile and mischievous pranks in spoiling the simplicity and freer utility of our Almanac, then we shall more gratefully own its constitutional uses in lighting our nights and causing the tides. Those are the moon's right uses; but should men, through the Calendar, continue in the impracticable old-time task of intruding the 29·53 days lunations of the moon as an evenly workable measure of the earth's inevitably complete daily spins during its yearly cycle round the sun, we should almost be inclined to ask whether such folk were "moony," if they adhere to dividing the year into our present crude, irregular months—most of which, be it remembered, have 31 days and are therefore 1½ days removed from the lunar month of 29·53 days, as the proposed 28 day month would be.

If they persist in moving our Chief Spring and Summer Festivals during those 5 weeks which show most contrast in our climatic

variations, and thus inconvenience the bulk of mankind, then we may almost imply that the "moon-worship" of the Ancient Arabians and earlier men is hereditary to the race, whilst the sterile old moon might almost complain of being thereby "overdone."

At the dawn of civilisation the moon's phases provided the only means by which men could record Time so far as they then imperfectly could measure it. Under such primitive conditions of life, quite naturally, the moon loomed very large in men's affairs and gave a rough-and-ready computation of time suited to their needs. But compare those with our present day life. Who now is so crude as to count time by the moon?—almost all civilised mankind of necessity turn to the printed almanac. Beyond the practical service of the "Tides" for mariners, very few persons, without the aid of a calendar, even know when the new moon begins, its power has so far waned: *yet we senselessly continue these obsolete months to the bewilderment of all,* **instead of designing our Calendar on rational principles to meet the best needs and interests of our common humanity, in such a way that everyone—even children—could easily understand it.**

The question naturally arises—Shall we transmit the old erratic almanac to burden future generations, or save ourselves and they all the avoidable worry, waste labour, loss and inconvenience we possibly can, and so do our duty towards advancing the cause of civilisation by simpler, more effective and convenient sub-divisions of the accepted year's length?

Counting the months by approximations of the moon's record, though very crude, was the only way practicable for primitive people in olden times, but it is surely too cumbersome for these days of progress.

It is a rather belated (almost comic) idea for 20th Century folk to base their Feasts and Holidays on the wanderings of the moon, which occupies 29·53 days (an absurdly unworkable unit), over its course, when we consider that our time must, of necessity, be based on the earth's revolution on its axis for our day, and on its journey round the sun for the year.

Only the privileged priestly classes and nobility among ancient peoples could depart from the moon-counting method until printed almanacs and clocks became cheap and widely distributed among the people to regulate the time. Therefore we can readily understand the tenacity with which illiterate people continued to count by moons, as the Mahomedans, wandering Arabs, and many primitive races still do.

As civilisation advanced men, who necessarily made distant and public appointments at quarter-moon times, were forced to adopt the more convenient and uniform week of 7 days, as the nearest in complete day counts to their old $\overline{29{\cdot}53} \div 4 = 7$ days "quarter-moon period."

If instead of trying to adjust the months to the movements of the moon, succeeding

generations had applied the similar common sense method of measuring their months to the nearest week in units of the convenient week, what a vast amount of needless trouble would have been saved, and what great conveniences would have been conferred on humanity throughout all subsequent generations. They would very nearly have hit upon the 13 months of 4 weeks herein suggested.

What probably prevented the general adoption of such a simple month of 4 weeks in early times was, the absolute necessity of counting months by the moon, as the common people scattered throughout the civilized world had not almanacs by which they could keep uniform count of the days and correct differences which might have arisen through defective records in those troublous times.

Therefore, when the vast majority of the people were illiterate, and so could only count months by the moon, they were compelled to continue a near approximation to the Lunar system when the Roman Cæsars fixed the present lengths of our months. But now we have so long passed beyond such illiterate stages and become used to almanacs which almost entirely ignore the moon, that civilized men have ceased to count time by lunar months, and do not now care the least whether the new moon begins or ends a month or whether two new moons occur in one calendar month.

Very few persons indeed now take any notice of moon-times, therefore the lunar necessities which restricted the Roman Cæsars to approximate to lunar months have ceased to merit compliance now-a-days, hence we should not longer needlessly bear the inconveniences caused by our present uneven months, etc., as it seems obvious to those who fairly consider the anomalies, unnecessary work, and constant references thus inflicted upon the 2,000,000,000 people now in the world, that the time has now arrived when a simpler calendar is highly desirable and practicable of attainment, because it would be of advantage to everyone and greatly facilitate public convenience.

This has been in my mind for several years, but in view of the fact that Christmas, 1916, is decidedly the best time to deal with the matter, I deferred making these maturer suggestions till this opportune time arrived.

These proposals simply outline what appears to me as desirable and practicable in the near future, after full consideration has been given to the importance of the subject. When that is accomplished in Christian countries, future generations may ultimately realize the further blessings of the ideal Universal Calendar, which could then be very readily made acceptable to all Races and Creeds by leaving out three consecutive "Leap Days," to adjust Christmas back to the natural year's end on the shortest day, December 22nd, which the Druids and Pagan Priests rightly kept as "Old Yuletide."

That natural beginning of the year governed by the Almighty God ruling the Universe, apart from all creeds, must ultimately be adopted by all.

It was most unfortunate that the founders of the Christian Church did not adopt that natural date, when it was quite clear that Christmas Day as then arranged did not fall on the true date of Christ's birth.

Probably they had to fix upon another date for like reasons of policy as those which led to the absurd shifting of Easter. Not being strong enough to withstand the Pagans, they had to fix upon a date as near Yuletide as they dare, through fear of their Pagan opponents and need of yearly Christian Festivities.

It seems evident that if the people take up the question seriously, public opinion will take some time to mature, and even assuming that it was decided to reform the Calendar upon some such scheme, I fully recognise that there would be so many Powers and Parties to move by their own slow stages, that it may prove impracticable to get more than the "1st and 2nd Steps" of adjusting Christmas Day, Leap Day, and fixing the Festivals in 1916. If only that be done, we shall gain the numerous advantages which will be derived by the adoption of that uniform Calendar of fixed dates and constant names for each date which would make each part of the year exactly comparative with the corresponding period of other trade years uniformly through future Periods.

Until that time arrives we shall never fully appreciate the manifold and very real advantages to be derived by the suggested Reform, as we have through so many generations been enured to the constant inconveniences which arise from the present changing style, that few can dissociate their minds from the existing anomalies of the Calendar, nor afford time to go fully into the complexities with which Antiquity has so long enshrouded the Almanac.

We realize some of the advantages which result from fixed dates for Christmas Day and New Year's Day, even though we usually change their week-day names. Why should we not apply like fixity to Easter when it would add so much to public convenience? Why longer perpetuate the senseless fluctuations of Easter when they so wantonly disturb and unequalize our periods for Governmental, Legal, Educational, Business, Church, Holiday, etc., purposes?

If the leaders of thought can be early brought to exert their influence in favour of the introduction of the 13th month, far more universal benefits will result from that "3rd Step," which could best take effect at the same time as the two previously urged, as then the Almanac would be simplified down to easily-worked months of 4 weeks, and all periods of earnings, expenditures, rents, monthly and bi-weekly administrative, educational, business, etc., arrangements would be greatly facilitated, whilst newspaper advertisement contracts and similar matters would then be far more easily computed, therefore I trust

that those who approve of the complete change will earnestly strive to convince their friends, and help all they can to mature public opinion, as this seems one of those questions which, like a dental operation, would be best done quickly to avoid needless trouble.

If we could induce His Holiness the Pope (who seems to almost have the key of the position in his hand) to see his way to call a Conference of the Christian Churches, and the other branches of the Church would respond in a Christian spirit, much more rapid progress might be made, for if the Churches agreed, the way would be much easier for the Governments to likewise act together.

As for critics, let them forbear their well-known weakness to display their own smartness at the expense of the main points at issue (or, as Ruskin said, "commenting on style," whilst overlooking the sterling value of his suggestions)—rather let them expend their energies on finding a better scheme, which, if really better, I would heartily support.

To criticise requires but little effort, seeing that we are all differently constructed mentally, and having different experience we all would naturally express ourselves somewhat differently on most subjects.

Let those who would on first impulse seek to belittle or oppose such efforts to reform the Calendar, reflect that History records no more important fact than that Julius Cæsar is gratefully held in remembrance by the civilized world for those reforms (*the chief of which was his reform of the Calendar*) he introduced for the benefit and convenience of his fellow-men; likewise Pope Gregory XIII. is revered for his wise work in adjusting the Calendar; whilst Napoleon I. probably did more real good to his country, and thereby won the truer admiration and regard of the French nation by his common-sense governmental work in the restoration of their 7-days' week in place of the *lengthened* Revolutionary week, which deprived the labourers of their needed Sunday rest—than by any of his great battles.

Very many thoughtful people of to-day regard with alarm the increasing tendency of the Press to fill the newspapers more with trivial matters such as find their right place in "Tit-Bits," "Answers," and the like. This pandering to the taste of omnivorous light readers is assuredly having its effect upon our national character. Our young people are thereby being led to give far less time to gaining solid and useful learning as compared with competitive nations with whom we should work for international progress and the welfare of humanity.

Would it not be better if, generally, the Press would give more prominence to these questions which more closely affect the real life and welfare of the people, instead of beguiling innocent people to Klondike by inflated accounts of the gold there, or discussing "whether kissing is dangerous," etc., when short of an idea, as such writing is sheer waste and a serious abuse of their

readers' time, when it is obvious that kissing will survive as long as humanity lasts. In short, let the Press *lead* the people towards really worthier and, therefore, brighter and happier lives by making their papers more practical for the public good. Happily, there are some signs that such will be the trend of the future, especially if the leaders of the Press and public act wisely in scouting those few newspapers which seek to enrich themselves at the expense of inflaming national hatreds instead of cultivating goodwill.

This rough outline has not the pretensions of an elaborate article, nor the finish of an essay; it is merely intended to get the public to think upon and discuss this question, which will be found to be more closely connected with the welfare of the people the more it is enquired into.

To gain the maximum advantages, efforts should be made to make the proposed change Universal by co-operating with other civilized nations to secure one uniform almanac (whether on this plan or some other), as the success of any such scheme could only be completed by the majority of Civilized Governments fully supporting one common plan. Uniformity in such matters would facilitate international intercourse; the people of various nationalities would thus gradually become better known to each other, and the higher interests of mankind would thereby be helped forward.

Russia is about the only remaining large civilized nation using the previous "old style" record of time. Probably with the advent of a simpler style during this century, our Russian friends and the Greek Church countries who have thus far continued their "old style calendars" might be induced to join in the simpler arrangement and thus extend its advantages, especially as their Calendars are now thirteen days behind those of other European nations, whilst in later years the Mahomedan nations of the East might come to accept the *simpler calendar*, as also the Chinese, Japanese, etc., who still use the Lunar Year.

At present it would be hopeless to try to induce the 1,000,000,000 of Mohammedans, Buddhists, Confucians, etc., to depart from their imperfect almanacs with their varied lengths of years used, as later detailed, when Christian countries have not even adopted one uniform Calendar (the Russians and Greeks still use the Old Julian Calendar dating 13 days behind ours); but if we wisely adopt such a simple Calendar as I suggest, its superior and increasing advantages will soon become so manifest to Races and Religionists now using the Eastern, etc., imperfect Calendar Years and Almanacs, that its universal adoption would be brought about within a much earlier period than at present seems possible.

The permeating influences of commerce and travel are enlightening the teeming millions of India, China, etc., to realise the advantages

of progress as the Japanese, etc., have done. The advent of railways, steam and electric tramways, machinery for manufacture, etc., will soon create, as it has done in Japan, such a growing incentive to progressive effort that the desire to employ the best methods in the public interest will soon accumulate to such a force as will bring about that universal change in the Almanac which would bring greatly needed convenience and benefit to humanity.

The interchange of scientific knowledge between all nations by books, the press, inter-university training, etc., is yearly bringing the thoughtful people of all countries to realize the importance of having the best in all things; **therefore, as the rising generations learn the supreme importance of the truest Almanac knowledge applied to national life, and realize that the evolution of a perfect Calendar is the ultimate result of the accumulated efforts of all their ancestors from the dawn of civilization, they will feel encouraged to complete the edifice which, by their stupendous efforts, the pyramid builders, obelisk hewers, monolith and mound erectors, etc., toiled to gain—as explained in the Pyramid Section.**

As the Egyptians, Persians, Indians, Chinese, Africans, Mexicans and South Americans look upon those ancient monuments and realize their great Almanac utility in preserving Ancient Races from famine and pestilence, by applying the Almanac knowledge their designers and builders so strenuously toiled to gain, the onlookers will be impressed with some sense of their duty to complete this greatest work of united humanity throughout all ages.

Our present Western style of Calendar combined with the jumble of Eastern and Oriental Calendars seems (so far as Civil convenience and simplification of the affairs of every-day life, accounts, statistics, etc., are concerned) like over-shadowing and retarding our work by using the dull light of the moon, instead of availing ourselves of the bright sunlight.

Shall we continue to inflict the present cumbrous and antiquated system upon ourselves and posterity, or shall we take the present opportunity to rectify the Calendar, and thus confer the much needed benefits already indicated, upon this and future generations?

Think whether it is not worth while to help forward this simple Calendar to gain even months, quarters and half-years, and avoid the present ever-recurring difficulties when fixing dates for meetings, etc., so that we may all instantly know any dates required without repeated references to Almanacs? Then note the week-end advantages added to Christmas, Fixed Easter and other Holidays, even if your limited experience and time may not enable you to realize the great saving of waste labour to Railway Companies, Manufacturers, Engineers, Contractors, Accountants and others in working out Costs of Work, etc.

I cannot, of course, judge as to how far my views, thus hurriedly and roughly set out, will find acceptance, and quite realize that some objections will be raised, and that the Reform may be longer delayed through wars or other causes. Still, I have tried to do my part in putting these ideas forward, after carefully striving to find out what Calendar would be most ideal for public convenience, and what is the best way to bring about that easily worked and most useful arrangement of the Year, for the lasting benefit of humanity.

As my time and means are limited, I cannot alone pursue the matter extensively, hence it rests with the Public, through the Press, etc., to decide what it elects to have done, as any such change would necessarily have to be done through the Governments of America and Europe, though it might with some advantage be applied to the British Empire, whilst possibly our un-conventional go-a-head friends in the United States might take the lead. Even if Europeans did not join at first, they would follow.

I shall most gladly welcome the assistance of all who desire to advocate this Reform, which should be pressed forward by all fair means in our power.

With a view to forming some definite idea of the interest evinced in this Reform, and arranging some consolidating effort towards securing an improved Calendar, will those in sympathy with this scheme kindly communicate with me (through the Press where they are able, as obviously I could thereby reply to numerous correspondents through one letter, whereas individual replies might be impracticable), so that, if advisable, united steps may be taken to give effect to the ideas I have indicated, or such modifications thereof as may prove most desirable?

At the same time please promptly fill in the enclosed "record-card" and post it, in order that those in favour of this movement may become united as an effective force to influence public opinion throughout Christian Countries.

It is intended, as promised at the end of the Introduction, to issue yearly an improved edition early in December, giving further information and a summary of the progress made, as recorded by the voting cards and letters, etc., received from the leaders of public opinion.

As it is obviously beyond the means of a poor initiator to conduct a propaganda adequate to secure this desired Reform, will those who wish to help the idea forward to realization, kindly subscribe for that object as far as they are able, and use their influence?

Any remittance you may be disposed to send in furtherance of this desirable Reform can be sent with letters to me, or paid in direct to the "Almanac Reform Account," with the York City and County Bank, York.

M. B. COTSWORTH.

Holgate,
YORK, 1904.

Price 1d.

THE NATURAL SOLUTION OF THE EARLY BIBLE AGES of MEN.

SHOWING HOW THOSE AGES ONLY EQUALLED OUR ORDINARY LENGTH OF LIFE.

As explained in the "Almanac" and "Pyramid" portions hereof, my sole object on commencing these Notes was to outline what appeared to be a most desirable method of Reforming the Almanac. In searching out the growth of the Calendar, I found, entirely on the ground of natural reasoning, that men must of necessity have used the lunar cycle (*i.e.*, month) as their first measure or unit for counting long times such as the lives of men. All evidence attests that men have had to seek out the laws of Nature in the spirit of "Seek and ye shall find."

For Almanac purposes only, I experimented (trying to keep apart from acquired educational knowledge) with such crude instruments and under such conditions as would alone be available for primitive men to gauge the Sun's seasonal elevations by. The shadows cast from stakes, vertical stones, etc., convinced me that these were obviously the simplest means men would first use to search out a longer natural period, yet the extremely complicated and apparently erratic working of these shadows would (as per Pyramid Appendix) require many generations of men's experiments to approximately find the length of the Year, whilst to derive exact results very much higher erections, presumably of pyramid shape, would be essential.

It was therefore impossible for men to have jumped direct from the month to the Year, when it is certain they could not trace the length of the latter; indeed for many generations they would entirely depend upon the moon and never think of the solar year. Besides, such a wide change could not be grasped through their restricted habits of thought, which were only capable of expansion by gradual stages, suited to the mental development of their times.

Still, the month would in course of time prove too cumbersome, in counting nearly 1,000 to a life-time, so they had to feel their way to longer measures step by step.

Just as men first counted the moon's period in days of the earth's rotation, so would they most naturally follow up that line of reasoning to seek out by Sun-shadows the required longer period from Nature's laws, by trying to measure the Sun's apparent motion by the longer month unit of the moon's period.

Further study of these shadows showed that the same lengths of shadow were recorded about each Half-Year, near the Equinoxes, in March and September, so I surmised that their next larger unit beyond the month would naturally be about Half-a-Year.———Turning to our oldest history, the Bible, to test that

conclusion, I at once saw (being used to figures—the study of numbers being my hobby) that as Abraham's recorded age of 175 years was rather more than double the present known length of life, it supported my idea, because *half-year measures of life* would of course *give double the number of years.*

Then, beginning to feel that I was on the track of the true line of research, my attention returned to the study of Sun-shadows, when it appeared clear from an old "Lengths of Shadows Table" for the year 1712 that owing to the "Equation of Time," etc., the mid-day shadows were of the shortest and therefore most noticeable equal length *for nearly a month during June*, and could not be differentiated until men erected very high points to cast longer shadows; therefore great difficulty would arise in fixing Mid-summer, whilst the problem of finding the Equinoxial points would be still more complex, as the equational time difference is greater, so that equal lengths of shadows *do not fall exactly on the Equinoxes*, which we know were the central points of Ancient research, as practically all the olden years began at either the Vernal or Autumnal Equinox (see "Table of Natural Gauges for the Sun").

Next searching for the early Bible length of the Year, I was surprised to find that months were not introduced till men began to sow seeds after the Deluge; but I was still more astonished to find from the date records of the Deluge that my reading of them conclusively proved, as demonstrated in the following pages, that only 10 months of 30 days each were used, and that neither the 11th nor 12th month could have been introduced up to that time.———Further analysis of the grouping of these months showed that the time recorded exactly covered 300 days, distinctly sub-divided into two periods of 150 DAYS; which, taken as the unit to divide into *Abraham's 175 "years,"* brought his age down to *72 of our years*, that is, *within the known length of life.*

Considering all the numbers and methods available, I became fully convinced that 150 days was, under their limited knowledge and conditions, pre-eminently the simplest and best period they could possibly have chosen as their first step towards a longer measure of life, because this "5 months' year" counted on the hand was their readiest method.

Tracing the ages of other patriarchs, further stages of men's developments of their "year" seemed evident, as the following pages show.

Thus I turned to the Bible to prove the results derived from natural research. My aim was NOT by natural research to prove the truth of the Bible. Therefore, in submitting these conclusions as the outcome of my investigations, it is only right to state that their basis was derived entirely apart from Bible considerations, consequently they more independently testify to the natural truth of its records by verifying the ages of the Patriarchs as natural lives.

Although those ages were then rightly expressed in such large and seemingly incredible numbers of so-called "years," the following arguments and adjustments of their numbers are submitted in proof of my conclusion that those lives were but equal to the present known normal length of 70 to 80 years' life—the explanation being that the earlier "years" were simply such "periods of time" as men could then most easily and progressively count.

Beginning with their first reputed "*year*," which was simply a "lunation," about *equal to our month*, these primitive "periods" for measuring time were, for greater facility, gradually extended to periods ("years") progressing from 1 to 5, 6, and then to 12 months, as they gradually "felt their way" in counting time, until they approximately found out the "Solar Year," which was so essential to public convenience, as it completed the Cycle of the Seasons.

Thus, whilst practically the *same lengths of lives* were measured by all these "time-standards" or "years" of increasing length, their resulting ages, as expressed in mere numbers of such unequal and therefore uncomparative "years" would diminish in inverse ratio.—In short, there was a

GRADUAL DEVELOPMENT OF THE "YEAR" (time-measure) during Patriarchal Times.

1ST STAGE (1 month "year") from the time of ADAM.

We find the first age or "record of years" in the Bible (Gen., chap. V.), where Adam is stated to have lived 930 "years."

Those "years," I venture to suggest, were but "lunations" (cycles of full moons = 29½ days) which, at the rough 12⅓rd "lunations" per year would, when measured by our years, give

Adam's age as $\frac{930 \text{ years} \times 29\frac{1}{2} \text{ days}}{365 \text{ days}} = 75\frac{1}{4}$ years.

In the same way, I am sorry to deprive Methuselah of his claim to be "the oldest man who ever lived," since his recorded 969 "years" (lunations) only equal 78¾ of our years; still, that was a sufficiently remarkable old age in those primitive, nomadic times of raiding and turmoil, in a hot climate, to point him out as having attained the then greatest age.

The early Psalmist's limit (Psalms XC. v. 10) of "*Three score years and ten*, and if by reason of strength they come *to four score years*," bears out this theory, since it can hardly be seriously argued that between Noah's and David's respective times organic changes took place in men, reducing their length of life to less than $\frac{1}{12}$th of its former limit. None of the discovered remains of ancient people indicate such altered longevity. The early writers or translators must at first have put "years" to denote "periods of full moons" or "moon years" by which men (next to the

essential day) would naturally begin their counting of "longtime periods," because the quicker transit and shorter phases of the Moon were most clearly marked, whilst during the lonely awe-inspiring nights they watched their flocks and wondered what its pale-featured face could be peering at, as it came round in regular periods irrespective of day and night.

Small wonder, therefore, that primitive men were almost awe-stricken by, and led to revere those vague features, which even the common people of to-day call "the man in the moon," especially when they could gaze thereon with ease; whereas the fierce glare of the Sun prevented any such ready view, whilst the absence of any discernible features on its surface left little beyond its light and heat to fire men's imaginations.

Further, the exceedingly gradual (almost imperceptible) variations in the Sun's altitude and heat were too slight to attract their notice in those early days before scales or anything approaching measuring instruments were known;—indeed the year's length of 365¼ days was unknown (except to the exclusive Egyptian pyramid priests) until the year B.C. 370: hence it seems altogether unreasonable to expect that primeval men could have measured and recorded their time in our long range year, which very few people now-a-days could grasp without the aid of an almanac.

The week is the nearer unit of unaided mental grasp, but obviously the emphatic changes of the Moon would at first be adopted to reckon long periods, as further proved by the Bible's recorded ages of parents when their first children were born, as such "years" when divided by 12¾ lunations per year, practically accord with the known early puberty of tropical races.—Defects in the early means of registering such large numbers of these very quickly recurring periods would account for minor differences in disturbing times, when many of those having families were mere children, with little sense of responsibility, and mostly led by little better than instinct.

Cases, well authenticated by medical men, are even at this period not uncommon in tropical countries, of children having been born of mothers nine years old, whilst we find indisputable cases have occurred even earlier. Can we, therefore, reasonably dispute that such would be the case with the earliest of our race, thousands of years ago, when probably their climate was hotter than now and self-restraint almost unknown.

The 120 years (equal to nearly 10 of our years) in Chap. VI. v. 3 seems applied to the age of adolescence—their coming of age or matured manhood, (just as we say the years to manhood shall be 21, but in some cases for a prince or princess they are legalized at 18). This agrees with the earlier accepted manhood of ancient people in hot countries—whilst the

term "his age shall be 120 years" could not be the limit of life, as Noah's 950 years and many other like ages are subsequently recorded. The following words (v. 4): "There were giants in the earth in those days" probably refer to the descendants of more matured and fully developed parents when the experience of later selected unions had brought a stronger race—as was demonstrated in the earlier parts of this 19th century, when the slave-owning planters of America, by restricting early marriages, bred their selected slaves to be of enormous strength, just as our farmers will not allow too young stock to breed by unchecked instinct, but now select stock of matured age to raise the strongest cattle and horses.

2ND STAGE OF THE "PATRIARCHAL YEAR" ERA prevailed from NOAH to JACOB'S time.

For the patriarchs to have jumped direct from the month to our long intricately measured year was practically impossible. That, we must all admit, would then be far too great a leap for them to attempt to realize, when we remember the tenacious regard with which they revered their olden methods, and consider that even now-a-days men will cavil about a single day in the year.

Even now the slightest possible disturbance by the "first step" towards "Calendar Reform"—which I urge we should take, by regarding Christmas Day as a day by itself—(apart from the week-day names)—to eradicate the senseless changing of the week-days each year—will be sure to be cavilled at by persons who, through not having fully considered these great questions in all their bearings, fail to appreciate the superior and preponderating advantages which would result from "Calendar Reform," when compared with the specious and misleading claims that will be urged for the continuance of the present Calendar; though I believe that persons who really think the matter out must come round to advocate the far simpler proposed Calendar, as arranged to meet present day requirements.

The failure of their "years" to fit in with the Seasons would cause increasing inconvenience when from Noah's time (Chap. VIII. v. 22) the earlier agriculture began with sowing of seeds, etc. They required to know definitely, by some sure mark or sign, the right time to sow, or their labours might be wasted. There the moon failed them. The difficulty would be still further aggravated as men spread northwards to the more suitable grain-growing lands where the Seasons became more accentuated. Then men would naturally seek for the cause of the Seasons, when it would dawn upon their minds that the Sun largely controlled them, whereupon they would next look to define its periods by measuring the regularly graded shadows cast by the Sun from trees, etc., till by erecting long sticks or poles they would, in seeking to gauge it more correctly, find that the mid-day shadow came to the same length at the times

when day and night of equal length recurred about once in every six moons, as is the case at our Spring and Autumnal Equinoxes. *(See Pyramid Appendix for fuller explanation.)* They could hardly have failed to notice that these Equinoxial points of equal day and night divided the days into two naturally even groups —(*a*) *post-Vernal*—when the days were longer than the nights, and (*b*) *post-Autumnal*—when the nights were longer than the days. These they quite naturally took as their determined periods or longer "years" required (which nearly equalled our half-year). Meantime they would observe that these two periods, *between their bounds of equal day and night*, were likewise sub-divided—Firstly (*a*) into periods of gradually increasing and then decreasing days; and secondly (*b*) their *vice versa* periods of regular increasing and then evenly decreasing nights. They would later notice that two of these "years" (of about 12 moons, or "months") contained all the four seasons, which they called "Seed-time and Harvest," and "Summer and Winter." (From these ultimately came our old "Quarter Days" and the beginning of the old style year at "Lady Day," March 25th.)—*See Pyramid Appendix re pyramid slope.*

We must remember that on the one hand men of the olden time clung most tenaciously to the ways of their forefathers; whilst on the other hand practical experience gradually urged them later to measure TIME in longer units or "years," thus defined as near as they then imperfectly could measure them.

But here arose a then practical difficulty with the scattered unlearned people, whose only means of time bargaining was by their old period, now for the first time re-introduced under the name of "month," Gen. VII., v. 11, whilst their only method of counting was by the "Score," using their ten fingers and ten toes (teens). They knew no 11 or 12 times tables and hence could not work in 12 months' much less in 12¼ months' terms, so they were compelled—however reluctantly—to resort to a long-time unit which could be sub-divided in accordance with their only existing means of counting (by the score limit—with its 4 sections of 5 units each). For that reason they had to be content with such a period as they could easily sub-divide into finger units; therefore, they fixed upon the simple 5 months of 30 days each for what I term their "PATRIARCHAL YEAR," because it was by far the easiest possible extension from their old *lunar "years,"*—which latter they then first began to call *months* (from the moon).

The change from "lunation years" to "solar years" was meantime inevitably being brought about as men's experience proved the Moon periods too short for recording long ranges of time, whilst they caused then confusing variations in their records of the Seasons, even though these were there less marked than in most parts of the present civilized world, owing to their semi-tropical climate.

Still the shorter period was continued as the "month," being derived from the "moon" which so well served the people's migrations in the cool night-time, and helped the watchers to guard their flocks and herds during the earlier "Pastural age" (thousands of years before printed almanacs were known). There again, the moon was their great guide, as the periods of gestation were recorded by the "months" required by their domestic animals to bring forth their young. These were Conies (Rabbits, which as children's pets were kept), 1; Swine, 4; Sheep and Goats, 5. We note especially that then men's chief occupation, wealth, and interest lay in the raising of flocks of sheep and herds of goats, as distinctly evidenced by the record of Jacob's (Israel's) dealings during his service with Laban's flocks (Gen. XXX. v. 32 and 33); hence their chief business in counting longer periods than the month was the recording of those 5 months' periods so vital to their flocks on which depended the family's future prosperity.—In that way they became accustomed to gauge these 5 months' periods, which ultimately became their second "long-time-unit" or "year."—Men must have had *an earlier reckoning by fives, before* they attained to *counting by tens.*

Further, this had the great advantage of eliminating the unworkable 29·53 days' period which they had, despite all effort, as yet failed exactly to understand, whilst it still maintained a close continuity with their old lunar style of reckoning. Moreover, this 5 months' "patriarchal year" of 150 days was the more workable from the fact that 5 months (when days were longer than nights) could be counted on the one hand when conversing with their fellow-men, and the other 5 (when nights exceeded days) on the other hand to show their "double year," whilst to these 10 could be later added *their* $\frac{1}{5}th$ (*i.e.*, 2) to complete the 12 months over which their SEASONS ranged. They were so used to computing *fifths* that their method of realizing 12 would naturally be by 10 + 2, *i.e.*, XII., as recorded in ancient times and understood by all who could then read anything. The Genesis method of describing the lengths of lives in "scores," etc., proves this was the case.

The resulting "150 days' year," as before mentioned, was evidently the "patriarchal year," as introduced after the time of Noah, for in the records of "the Deluge" (Gen., Chaps. VII. and VIII.) both systems (the "month" and the "150 day year") are concurrently used, and it is very remarkable that the term "month" is then first introduced as a continuation of their "old style" to sub-divide the new 150 days' "year." Still more remarkable is the fact that the details therein given incontestably establish the fact that those months were all exactly 30 days long, and that their double year consisted of 2 groups of 5 months, or 150 days each (*i.e.*, 10 months was then their limit—not 12 as now)

as proved below, where I quote chapter and verse for reference :—

				Month of 30 Days.		Days
Chap. VII., v. 11, Flood began	2nd Month	17th day, left		18 days.		
Then we have by sure and absolute deduction	3rd	„		30		
	4th	„		30		
	5th	„		30		
	6th	„		30		
Chap VIII., v. 4, Ark rested on Ararat on	7th	„ to 17th day	=	17		
				—		
Chap. VII., last verse, 24, the downpouring of "the waters prevailed upon the earth 150 days"				Total 1st period	=	150
Again by certain and clear deduction we get	7th Month's remaining ..			13		
	8th	„		30		
	9th	„		30		
	10th	„		30		
	1st	„		30		
Chap. VIII., v. 14, left the Ark	2nd	„ 27th day† ..		27		
				—		
				160		
From which to end the 2nd of the halving "years" we must deduct from the latter 2nd month, 27th day,† the excess of 10 days to complete their "year" on the 2nd month, 17th day, upon which we began the year, as per 1st line	*2nd	„ 17th day				
		10 days diff.	=	10;		
				—		
Thus proving the 10 months limit, and the 2nd period, as per Chap. VIII., v. 3, during which "the waters returned from off the earth continually; and after the end of the 150 days the waters were abated."				Net total 2nd period	=	150
No 11th or 12th month was known in this "Double Year"			=	300		
				—		

† 10 days elapsed, during which the sodden ground dried, AFTER the "waters were abated," and before Noah left the Ark.

It will be noticed that in both cases the 150 days' periods *are mentioned first* AND THEN THEIR DETAILS FOLLOW; hence reasoning on the same lines, we may fairly deduce the evident jumble of verse 13 of Chap. VIII., which states "in the 1st *month*, the 1st *day* of month, the waters were dried up from off the earth" - - - - - "and the face of the ground was dry." I think it is extremely probable that the earlier writers or translators have mixed up the beginning of the new "Patriarchal Double Year" which they did not understand because they failed to grasp that beginning of the new Era of time.

Noah's family would almost certainly, and of necessity, begin to count their "years" as from the day they began their life almost anew on landing from the Ark (2nd month, 27th day), which day would subsequently be called their New Year's Day. Noah, as the head of the family, having so far counted his life in lunation (month) "years," would naturally keep to that method of reckoning his life to compare with the ages of his ancestors; but the Deluge would be the time-mark for his children to date from, as of necessity all time has thus had to be dated back—(see end, Notes on Chronology)—though for one or more generations the two periods of "month" and "5 month" *years* would probably be concurrently used until the superior "5 month" period became general. This view seems still further borne out by the fact that first *month* and then *day* are recorded by v. 13, *in italics*, thus clearly demonstrating that the translators were puzzled to find out what to put for this 1st of the period or New Year, and hence could not with certainty fix upon the exact equivalent meaning of the old words, which they had to guess at, and in so doing have muddled or lost the meaning of the passage which they only knew meant some

This 10 months' (5 x 2) Year seems to have continued through Asia Minor and Europe till after 754 B.C., as the Founders of the Roman Empire distinctly record it. (See Almanac Section, page 1, &c.)

period of time. It may be that this error may have crept in through traditional defects, old illiterate translations, or decayed manuscripts. I expect that when expert Hebrew scholars derive the true meaning of the 13th verse, it will be found as I here suggest—that its real meaning was to record the beginning of the new "Patriarchal Era," and that the 1st month, 1st day, denoted its commencement, or "New Year's Day," as per their old style 2nd month, 27th day, when the waters had dried up and the people left the Ark. Read in any other way, v. 13 seems absurd, as surely if the earth was *dried* on the 1st day of the year there could have been no sense in waiting till the (30 + 27) = 57th day of the year before they left the Ark in which it is said they had all been imprisoned so long, when its crowded animals, etc., so sorely needed food and liberty. Further, there could be no purpose in again repeating the fact of the earth being "*dry*" enough to let them come out after 57 days, if it had been dry before.

That to my mind is further most conclusively proved to be a blunder, which when righted explains the otherwise inexplicable *difference of exactly 57 days* which existed between the "Era of Abraham" and the "Era of Nabonassar" (the founder of Babylon)—by which latter all other eras may be connected and adjusted—the reason being that whereas *Nabonassar's years were consecutive* for all recorded time, and verified by the Egyptian and Babylonian independently recorded continuous lunations, the descendants of Noah had harked back from calling their landing day (the 27th of 2nd month) to re-naming that eventful date the 1st day of 1st month or "New Year's Day," to commemorate the date of their landing from the Ark and their fresh start in life.

For fuller detail see Pyramid Section, page 157.

We must remember that all History proves fresh eras were always dated back to some great event, and in most cases they were not really established by custom till many years after the occurrence to which they harked back, as shewn on the last page of this section headed "Notes on Chronology."

What could possibly be more natural, therefore, than that Noah's descendants should begin a new era of years based upon these two terms of 150 days, which would later be so strongly pressed upon their minds when subsequently speaking of the greatest devastation they ever heard of, and from which they believed that their race alone had been spared? The 150 days would almost inevitably be taken as a natural long-time-unit.

When all their surroundings were new, and they had to begin all over again, it was certainly the most natural course for them to count back to the "time of the Flood." Even if the idea of the "new era" did not strike them at the outset—(when they would have so much to do in looking after their stock, renewing their varied wants, sowing their

This primitive system of counting in FIVES is still in daily use at almost every port in the World or tallying the numbers of articles shipped by recording four vertical strokes and a diagonal line

seed, etc.)—that great and overpoweringly impressive event of their lives must have been the great theme of their conversation and of wonderment to their grandchildren and subsequent generations, whilst even if its periods of 150 days' gradual rising of the flood and its 150 days' receding may have been in any way a traditional exaggeration, that would not detract from the effect of those periods on the minds of the patriarch's reverential descendants. Possibly some inflation may have arisen through the patriarchal uplifting of both hands—when each hand denoted 5 months—in verbally describing the length of the deluge time, during several generations before written records were known, and when defects in memory and tradition possibly led excited imaginations to magnify the number of days —about which I preserve an open mind.

Those periods would almost inevitably take such a strong hold upon the superstitious minds of such subsequent generations as to lead them to count their then called "years" (of 150 days each) for their longer reckonings. This is the more probable since, as already stated, their months were of 30 even days, hence their easily understood 5 months, as shown by the hand, would exactly fit their "year" and conveniently sub-divide it, whilst the next 5 months to 10 inclusive would form the 2nd half of their "double" year" which completed 10, their then grade of count, as proved by the phraseology of Genesis.

A further confirmation of the origin of the old "double year" (half year called a "year") may be derived from the curious over-lapping of the Jewish years after the Captivity, as their old "Sacred Year" began with their 1st Month at the Vernal Equinox (our March 25th) whilst their "Civil Year" began half-a-year later at the Autumnal Equinox, thus repeating the principle of the dual years long after the time their years had been extended to 12 months at the Exodus,—for, be it remembered, no mention is ever made of the 11th or 12th month until long after then, and as the Jews stayed so long in Egypt there can be little doubt but that Moses acquired the *12 MONTHS YEAR FROM THE EGYPTIANS WHO WERE THE FIRST TO USE IT, as they alone had been able to determine its length from their experimental results derived from the observed gradations of the shadows cast by the Pyramids—as explained in the Pyramid Appendix hereof.*

In this conclusion I am most remarkably and decisively supported by the Hebrew name for the year, which is identical with the root *shânâh*, meaning "*he or it repeated*," "*did the second time*," which naturally explains the origin of that which I call the "patriarchal year."

This 2nd stage or 150 days' year is also strongly confirmed by the recorded ages of Abraham's 175 "years" and Isaac's 180 "years," which, when adjusted to our present solar years=72 years and 74 years respectively, derived thus:—

$\frac{175 \times 150}{365} = 72$, Abraham. $\frac{180 \times 150}{365} = 74$, Isaac.

This quite logically brings their ages within true rational limits, and solves the difficulty of incredulous persons who have hitherto failed to grasp that these comparative ages accord with what we actually know of the present length of life.

3RD STAGE (6 months' year).

During Jacob's life (147 "years") the year appears increased to about 6 months=180 days, which in our years makes

$$\frac{147 \times 180}{365} = 72 \text{ as Jacob's age.}$$

His long 21 "years'" apprenticeship for his wives and animals, during which he zealously watched the periodic increase of his flocks when with Laban, would early tend to closer observation of the Seasons, and thus lead to his conclusion that 6 moons, as a dual period, appeared to divide the Seasons more evenly.

That fact is proved in full detail from page 149 onwards of the Pyramid portion of this book, which shows conclusively that this "6 months' year" (which Jacob found out by studying the Seasonal points of Sunrise by the aid of the "pilled rods") was undoubtedly continued in use by his descendants (the Israelites) until the Exodus.

The arguments and data upon which this fact is established, will be best understood and more appreciated after reading the intervening pages, it will therefore suffice here to note from Genesis xxx. 37, that "Jacob took him "RODS of *green-poplar* and of *hazel* and *chestnut* "tree, and pilled white strakes in them, and "made the white appear which was in the "rods."—Here only one comment need be mentioned:—

1. There were THREE distinguishing kinds of rods used, *poplar*, *hazel*, and *chestnut*, to mark the most Southern point of Sunrise (Winter Solstice), the most Northern limit (Summer Solstice), and the Mid-way point *(Equinox)* between them respectively.

This latter Equinoxial point marked the best time for mating his flocks, which was the first object he had in view, as Jacob had the most enticing incentive in the highly-prized reward of riches then cumulative in cattle; but when his prolonged stake-sighting observations convinced him that such season coincided with the alternate times when day and night were alone equal *(at recurring half-yearly Equinoxes, each 6 months)*, he naturally took that most suitable basis of Time for counting his "Years."

This "6 months' Era" is explained in fuller and more conclusive detail on Pyramid Section, pages 152, &c.

Exodus XII. 40, most unmistakeably states: "NOW THE SOJOURNING OF THE CHILDREN OF ISRAEL (*i.e., JACOB'S CHILDREN*), WHO DWELT IN EGYPT, WAS **430** YEARS."

My experimentally formed belief that those so-called "years" were really *half-years*, led me to test that period by the Bible chronology of the Authorised Version. Turning to Gen. XLVI. and XLVII., which records the events of Jacob and his family's going down to settle in Egypt, I found that the date recorded

over those chapters was ... 1706 B.C.,
and as the date over all the
Exodus chapters was ... 1491 B.C.,
that proved that there was —
only a stay in Egypt of ... **215** full yrs.

and as that was exactly half the recorded 430 Israelitish "years," it proves that they counted by "½-years," therefore there can be no doubting the fact that until the Exodus the Israelites continued to use Jacob's stake-found "6 months' year," by counting the Equinoxial Sunrises.

I was delighted to find such final and absolute proof, which raised my idea that the Early Bible Men only lived the present known length of life, and must have counted by smaller Time Units than our Year, from the status of a theory to that of a firmly established fact.

I am quite aware that commentators have endeavoured to account for this "430 years' period," by stretching it back to the time of Abraham's first visit to Egypt, (as the writer of the Septuagint did in his efforts to adjust the apparent discrepancy and also with similar unjustifiable license purposely added 100 years to each of the lives of several Patriarchs, to make the Samaritan records appear more venerable than those of the Jews)—*but that is a subterfuge quickly disposed of, because Abraham and Isaac being "forefathers" of Jacob (Israel) could not be included as "children" of Israel, therefore the latter term, as used in the original sacred scriptures, could only apply to the "descendants" of Israel, who alone therefore clearly counted their* **430** *"half-years" whilst in Egypt.*

The writer of the Septuagint knew that the **215** true years, which were verified by Egyptian chronology, could not be refuted, hence his expanding efforts to reconcile the **430** "years" recorded, when he did not know they were only *half-yearly counts.*

I confidently submit to all fairminded and unbiassed readers that the original authenticated record proves beyond the possibility of quibble, that the Israelites had most naturally clung to the simple "6 months' year" which Jacob (afterwards called Israel) as the Father of their Race, had discovered during his prolonged 21 years' experiments when serving Laban.

THE 4TH STAGE OF "12 MONTHS' JEWISH YEAR," according to my reading of the Bible, thus appears to have been initiated at the Exodus, *vide* Exodus xii. 2.

It seems highly improbable that during the "Bondage" the Israelites would have renounced the very simply watched "6 months' year," *which their forefather, Israel, had found out and established.* That was the simplest and best possible system for an illiterate race, living in fixed areas where the true orientation of "fixed sighting stakes" could be applied; but directly it was decided that they should leave Egypt and wander in the Wilderness, Moses quickly saw that such a system could not be accurately applied during their travels, as the compass was not available to point the true East direction, and apparently slight deflections to the North or South would cause serious discrepancies between the "Years"—hence the only practicable course was to adopt the tested and valued Egyptian knowledge of the Year, and from it frame a Calendar suitable for the Israelites before starting their journey, as I believe was then done by Moses.

Readers requiring fuller information *re* Jacob's (½-year) Era, Joseph's adjustments of the Calendar to cause the Years of Plenty and Famine, also the *first 12 months' Jewish Year* which Moses gained from the Egyptians and gave to the Israelites, are referred to pages 149 etc., of the "Pyramid" Section.

The ages of Joseph, Joshua, and Moses are satisfactorily explained by the growth of the "Year Period," as here indicated for Moses, whose 80 years in Egypt were only Israelitish "6 months' years," equalling 40 "12 months' years," added to which the 40 full years in the Wilderness bring his length of comparative life to 80 of our years.

Similarly, Joshua's $\frac{40}{2}$ (as 6 months' years) in Egypt = 20 true years plus the full years after leaving Egypt = 70 ,, ,, bring this ancient warrior's life within the credible age of 90 years, or nearer 80, if he did not change to the longer count until after the Law was given at Sinai.

Joseph was evidently a very old man, as Genesis L. 23 makes that exceptional fact clear by the words, "Joseph saw Ephraim's children of the 3rd generation," showing that he lived to be a great-great-grandfather, which in those times of early marriages might result in less than 80 years—an age quite possible under the pleasant, healthy conditions of his time.

That is quite near enough to satisfy credibility, though we shall never know how long he retained the Israelitish "6 months' year" in Egypt, but seemingly he later adopted the Egyptian Year for counting his life. He was 13 Israelitish years old when sold into Egypt. If he counted up to 60 in his father's years, he would be 30 of our years old when he adopted the Egyptian year. Then his age at death would be 80 of our years.

The Israelites naturally adhered to their tribal "6 months'" reckoning, until their deliverer, Moses (who as an Egyptian trained statesman had learnt the real value of the 12 months' year), wisely applied that knowledge as the *very first step towards the Exodus*, when the New Era was adopted, as distinctly stated in Exodus XII. 2:—"This month shall be unto you the *beginning of months;* it shall be the *first month of the year* unto you."

To simplify the change to suit the wanderings in the Wilderness, the most easily counted year of 12 lunar months was appointed.

In proof of this theory it is very remarkable that until the Exodus neither the 11th nor 12th months are mentioned, and it is still more significant that during the preceding 3rd stage of the patriarchal efforts to develop a suitable "year," as the natural gauge of life, the ages of even the elders, etc., are unrecorded and the term month is ignored, although much use was made of its introduction in Noah's time, and after this full year is reached, great stress is again laid upon months. That is probably owing to the uncertain transition of their periods through the heads of different families holding to their old scales of ages—counting their life out on the basis used in their youth or early manhood.

Thus I hold that the growth through different lengths of "years" was gradual, until the 12 months recorded year practically brought the recorded length of life down to what we know to be the natural limits when measured in luni-solar years. Hence, from the time this truer year appears, incredibly long ages of men cease to be recorded in sacred history, because their measure of life was so extended that the natural period was thus *reduced in numeral expression only* to David's well-known Psalm limit of three score years and ten = our 70 years.

Will my critics kindly bear in mind the fact that this has not been written to prove the truth of the Bible, but entirely originated in reasoning out the Almanac to see how men would "feel their way" to the true length of the year.

I submit that the arguments and facts seem reasonable, and that if on testing and sifting they are established, the truth ought to prevail; for, even if it to some extent upsets old ideas of chronology, we want to know as near as we can get to what is right. Having, by experiments with upright poles and models, convinced myself of the simplest and most probable means early men could employ, to find the length of the year, I felt bound to test this theory with the earliest available history, which is best found in the Bible. The results of these investigations are here given, to be tested by those so inclined and interested therein.

Whilst the above may interest readers, it is hoped they will bear in mind that it is entirely subsidiary to the real practical benefits which an enlightened Reform of the Almanac would at once confer on humanity, earnest support for which is desired.

PHOTO-PRINT FROM THE

"TRAVELLER'S ALMANAC" for 1712

(now in my possession).

The English

Chapman's and *Traveller's*

Almanack,

For the Year of CHRIST, 1712.

Wherein all the Post-Roads, with their several Branches and Distances, the *Marts*, *Fairs*, and *Markets* in *England* and *Wales*, are *Alphabetically* disposed in every Month; so that the Place *where*, and the Days on *which* any of them are *kept*, is immediately found out.

To which is added,

A TABLE of ACCOUNTS

READY CAST UP,

For the Buying or Selling of any Commodity by *Number*, *Weight*, or *Measure*, from One *Farthing* to Ten *Pounds*: and of any *Quantity*, from *One* to *Ten thousand*.

WITH

A Sun-Dial, and other Tables and Things useful for all Travellers, Traders, and Chapmen of what kind soever.

ALSO.

The rising and setting of the Sun and Moon, the Tides, the Length of Days, Increase and Decrease of the Days throughout the Year, and whatsoever else is necessary for an Annual

ALMANACK.

LONDON, *Printed by* E. James *for the* COMPANY *of* STATIONERS, 1712.

A Brief Chronology, in 1712.

Since

THE Conquest of *England* by Duke *William*,	646
The Invention of Guns,	335
The Art of Printing was Invented,	362
The Infectious Sweating Sickness,	361
The Massacre in *France*,	140
The whole Heavens seemed to burn with Fire,	138
The General Earthquake in *England*,	132
The Camp at *Tilbury* in *Essex*,	124
The Gun-powder Treason,	107
The Voyage to the Isle of *Ree*,	81
The Duke of *Buckingham* Murthered,	80
The Plantation began in *New-England*,	80
The Third part of *London-Bridge* burnt,	80
The Earl of *Stafford* was Beheaded *May* 12,	71
The *Irish* Rebellion began *October* 23. 1641,	71
The Fight at *Edge-hill*, *October* 23. 1642,	70
The Fight at *Brainford*, *November* 12. 1642,	70
The *Scots* entered *England*, *January* 16.	69
The Fight at *Newberry*,	69
Marston-Moore Fight, *July* 2,	67
The great Fight at *Naseby*, *June* 14. 1645,	67
King *Charles* was Murthered, *January* 30.	64
The *Scots* routed at *Dunbar*, *November* 3.	62
The great Fight at *Worcester*,	60
King *Charles* II. returned to *London*, *May* 29,	52
King *Charles* the II. was Crowned *April* 23,	51
The strong Tempestuous Wind, *February* 18,	49
Three Blazing Stars appeared,	47
The last great Plague in *London*,	47
A great Fight between the *English* and the *Dutch*,	46
The great Fire in *London*, *September* 3, 4, 5, 6,	46
King *Charles* the IIs died *February* 6. 1684	38

PHOTO-PRINT FROM THE

"TRAVELLER'S ALMANAC" for 1712.

1712

Fairs in January.

Briſtol 6 and 25	Graveſend	25	Llangiony	7
Churchingford 25	Hickford	5	Llondyſſel	31
Derby 13	Llanbither	3	Salisbury	6

The uſe of the Sun-Dial.

FOR the ready finding of the Hour of the Day by the *Dial*, you muſt provide a ſtreight Staff or Ruler, which muſt firſt be divided into Ten equal parts, and then each of thoſe into Ten other ſmaller parts, ſo will the whole Staff or Ruler be divided into 100 equal parts, which may be numbred by 10, 20, 30, &c. to 100. And ſo it is fitted for Uſe.

Now when you would find the Hour, you muſt erect your Staff or Ruler perpendicular, that is, let it upright upon ſome plain level Ground, Floor or Table, and note the place where the end of the Shadow did fall, and with your Staff meaſure the length of the Shadow in Staves lengths, and hundred parts of the Length, according as it is numbred.

Example, Suppoſe that on the 16th day of *January* I do erect my Staff perpendicular, and meaſuring the length of the Shadow thereof, I find it to be exactly 3 times its length, whereof finding the 16th day at top of the Month of *January*, I find 3, 0, to ſtand againſt the 16th day, and at the top find XII. which tells me it is then juſt 12 a Clock. —— *Example* 2, Suppoſe that upon the 5th of *May* I erect my Staff as before, and meaſuring the ſhadow thereof, I find it to be twice the length of the Staff, and 24 parts more, wherefore, I look at the top of the Dial in *May*, for the 6th day, and caſting my eye along that line, towards the right hand, I find 2, 24, to ſtand in that Column, at the top of which is VII. V. which tells me it is either 7 of the Clock in the Morning, or 5 in the afternoon. —— *Example* 3. Upon the 16th of *April*, I find the length of the ſhadow to be once the Staffs length and 20 parts more; I look in *April* for the 16th day in the Sun-Dial, and in the line againſt it for 1, 30, and againſt it in the fifth Column I find 1, 33 (which is the neareſt number neareſt to 1, 30, in the Table) over which there ſtands IX and III, which ſhews that it is almoſt 9 in the morning, or a little after 3 in the afternoon. —— *Example* 4. Upon the 26th of *June* I find the length of the ſhadow of the Staff to be once the whole length, and 20 parts, if I look for this Number 1, 20, in the Sun-Dial againſt the 26th of *June*, I can find no ſuch Number, but the neareſt to it 1,18 in that line is 1, 01. over which ſtands IX, III, and the neareſt number to it, greater, is 1, 38. over which ſtands VIII, IV, ſo that you may conclude the hour to be between 8 and 9 in the morning & between 3 and 4 in the afternoon. A little practice will make all this plain: For *Uſus optimus Magiſter*.

Sun-dial.

January hath XXXI. Days.

Hours	XII	XI I	X II	IX III	VIII IV		*Morning Afternoon*	The Traveller's *Sun-Dial.*
1	3 60	3 91	5 11	9 72				
6	3 A1	3 68	4 76	8 63				
Days 11	3 21	3 46	4 40	7 60	92	84		
16	3 0	3 21	4 5	6 69	54	37		
21	2 79	2 99	3 71	5 89	20	81		
26	2 58	2 76	3 39	5 18	14	51		

1	a	Circumſion of	feet	4			6	12
2	b	Our Lord	head	5	First Quarter		7	0
3	c	Sun riſe 8, 7.	and	6	The 5 day,		7	48
4	d	Sun ſet 3, 54.	face	7	12 min. after		8	36
5	e	Day 7 h. 50 m.	neck	♌	10 at night		9	24
6	f	Epiphany of	throat	9	*Snow or Sleet*		10	12
7	g	Our Lord	arms	10			11	0
8	a	Lucian Pr.	and	11	Full Moon		11	48
9	b	Day Lengthned	ſhonld.	12	The 12 day,		12	36
10	c	Sun in Aquar.	breaſt	13	3 quarters af-		1	24
11	d	51 min	ſtom	14	ter 7 at night.		2	12
12	e	Sun ſet 4. 6.	heart	♒	*Dry Wind.*		3	0
13	f	1 S. aft. Epiph.	back	16			3	51
14	g	Day 8 h. 18 m.	bowels	17			4	43
15	a	Day lengthened	belly	18			5	35
16	b	1 h. 7 m.	loins	19	Laſt Quarter		6	27
17	c	Sun riſe 7. 46.	reins	20	The 20 day,		7	19
18	d	Priſca V.	ſecrets	21	at 5 in the		8	10
19	e	Sun ſet 4. 17.	membr	♓	morning.		9	0
20	f	2 S. aft. Epiph.	hips	23	*Cold Rain*		9	51
21	g	Agnes V.	and	24	*and Windy.*		10	43
22	a	Vincent	thighs	25			11	36
23	b	Term Begins	knees	26			12	27
24	c	Day 8 h. 52 m.	hams	27			1	18
25	d	Conv. St. Paul	legs	28	New Moon		2	10
26	e	Sun riſe 7. 27.	ancles	♑	The 26 day,		3	0
27	f	3 S. aft. Epiph.	feet	1	3 quarters		3	48
28	g	Sun ſet 6. 36.	and	2	after 9 at		4	36
29	a	Days lengthened	toes	3	night.		5	24
30	b	K. Ch. I Mart.	head	4	*Milder weather.*		6	12
31	c	2 h.	face	5			7	9

N.B.—The Sun-dial details and middle table for every 5th day prove that the length of shadows were used to find the time in England in the 18th Century.—**M. B. COTSWORTH, Holgate, YORK.**

THE

PYRAMIDS

OF

EGYPT, MEXICO, ETC.:

THEIR SOLUTION—SHOWING WHY THEY WERE BUILT.

THE problem of the Pyramids is of such magnitude and intricacy that it has perplexed humanity and remained unsolved for the last 4,000 to 5,000 years. Readers will therefore readily understand that its solution cannot be adequately dealt with, nor lightly disposed of in an appendix to this small book on "Calendar Reform." Still it seems most APPROPRIATE that it should be introduced here AS THE BASIS OF THE CALENDAR, since experiments and investigations have led me to believe that the REAL OBJECT OF THESE STUPENDOUS ERECTIONS WAS TO DETERMINE THE SEASONS AND EXACT LENGTH OF THE YEAR by their regular graded and recurring shadows.

The foregoing "Calendar Reform" pages have already briefly outlined the incidents and tests leading to these conclusions. Space did not admit of more in that short notice intended for the popular use of the hurrying crowd whose time is pressing; but for the more leisured people the further explanation in this appendix seems desirable even at the expense of some repetition; whilst for the higher purposes of knowledge and criticism by the Learned Professions a more adequate work with further diagrams, etc., will be issued if and when time permits.

I hope to show herein that the value of the knowledge as to the true term of the Calendar was fully adequate to lead men to undertake these almost inconceivable labours, and that the Pyramid was their most natural means towards that end.

At the outset we may note the following:—

ARGUMENTS.

1st.—That the PYRAMIDS of EGYPT are approximately as far NORTH of the "Tropic of Cancer" as those of MEXICO are SOUTH of that latitude.

2nd.—On both sides of the Atlantic they have been built by distinct peoples of great antiquity whom we cannot trace had means of communicating with each other.

3rd.—Both peoples developed a high standard of civilization (probably independently) as proved by their marvellous architectural structures still remaining.

4th.—Each of these widely separated races had resorted to building stupendous PYRAMIDS—all on rectangular bases with gradually developing slopes of triangular sides.

5th.—These Pyramids are erected on elevations—not on the low-lands or close to river-banks where they could have been easier built—to catch the full and constant rays of the sun; whereas had they been built for Tombs or Temples men would naturally have preferred the shade of more sheltered positions on the ground of personal convenience, especially in those hot climates.

6th.—The designers, erectors, or keepers of these Pyramids in Egypt, Mexico, etc., are known to have **constructed, amended and reformed the Calendar** from time to time—for which great benefits they have been revered by subsequent generations.

7th.—Both Nations (presumably by these Pyramids) developed a Calendar giving the length of the Solar year in days and Seasons.

8th.—Tradition has always held that the Pyramids were built for some great occult astronomical purpose, the real object of which, though lost in past ages, is believed to be here indicated.

9th.—The chief of these, "THE GREAT PYRAMID OF EGYPT," is so constructed that it "consumes its own shadow" at mid-day of the Vernal Equinox on March 25th,—when the oldest complete style of year began.

10th.—We still find existing in various parts of the world huge monolithic stones, variously called obelisks, sky-stones, sun-stones, sun-temples, etc., which were erected vertically, in pyramid or obelisk form, by nearly all the great nations of the most ancient times; but far greater numbers were probably then set up, thousands of years ago, many of which have since been destroyed or removed. They all show that most determined, continuous, and wide-spread herculean efforts were made to fix upright the largest possible monoliths, of the most durable material, carefully chosen and prominently erected with great care and stability to withstand the strongest winds, etc. These conclusively indicate that they were intended to serve the same great, useful purpose and satisfy the widely-felt common need they testify as then existing.

From the above I deduce that all these ancient erectors, whether of vertical stones, cones, or pyramids, etc., whether in Egypt, Arabia, India, China, Mexico, France, Great Britain, or elsewhere:—

(1) All had a similarly practical objective use.

(2) The result of their laborious work and care was intended to last the longest possible time, and be of real service to posterity.

(3) Their uniform object must have been of the highest importance to numerous people, and probably a necessity.

The supposition that these most stupendous efforts of the earlier thinking men were set up as gods to worship seems incredible. Apart from the over-aweing influence of priest-craft's veiled designs to usurp power and establish their class interests over the people, or the slave bondage of men, our experience of mankind is that much smaller blocks, or aggregations of smaller stones piled up, involving less efforts, would have sufficed to meet the earliest religious ideas of men. They would have made less serve. They would probably have chosen as their model to worship something indicating life and being, such as peculiarly developed trees, or mountains or rocks approaching human or animal shapes. Had they set up stones as gods, such would likely be of beautiful stone or significant shape, and not the rugged, unattractive, irregularly hewn stones we find pointing sunwards.

Equally unsatisfactory is the suggestion that these were erected as "Temples." They cover nothing. The priests could not address their congregations from the top of such high spiked stones, devoid of foothold. Acrobatic attempts of that kind would have undermined their sedate priestly influence, and be the most unlikely thing for them to attempt when their more athletic people could easily "give them points" in daring nerve and balancing powers.

My answer to that contention is that these sharp pointed stones were purposely selected to cast an easily-marked pointed shadow which would indicate the hour of the day, etc. Further, the stones were required in solid blocks to ensure stability, and cast the longest possible shadows from a fixed vertical height to trace the progress of the Seasons by the differentiation of their shadows, which vary so slightly and gradually that they could not be traced and studied with the requisite accuracy from smaller erections.

Most probably the priests, after so using these obelisks or sky-pointers, and measuring their shadows at intervals to trace the movements of the Sun and Moon, predicted the Seasons, when the common people would be impressed with supernatural ideas and, seeing the priestly antics round these stones and shadows, would in time through prevailing ignorance and superstition come to look upon these erections with mystic regard—hence the "Temple" idea would later arise.

These great erections, whether called "Vertical Stones," "Sun-stones," "Monoliths," "Obelisks," or "Pyramids," etc., have thus been by tradition uniformly connected with

"Sun-worship," which had this apparent mystic origin; but it appears more reasonable to conclude that their erectors were more practical, and rationally intended these massive towering works, involving such protracted labour, to be used to solve the Seasons, —that greatest problem of their lives, the knowledge of which could be applied to ensure reliable crops for yearly food.

The fact that these erections are orientated to the N., S., E. and W. points of the compass supports the conclusion that they were used to determine the TIME of the day and SEASONS, which constituted the greatest problem of common need which would earliest press upon mankind. That they would most obviously derive by studying the Sun's seasonal elevations, which could best be traced by recording and comparing the shadows cast from tall fixtures during long periods. Moreover, their most feasible means of finding out the length and course of the year was evidently by studying these sun-shadows, which probably started astronomical research.

All the foregoing known facts support and point direct to my independent conclusion, that the real object of the Pyramids was to determine that most vital factor of human knowledge—the length of the Year and its Seasons, so essential to the welfare of Nations growing in population, and thus forced to develop a higher civilization with assured regularly increasing crops to meet the growing needs of its people.

The full force of that pressure of need 5,000 years ago cannot be gauged now that men have subsequently passed through over 200 generations, during which the evolution of our present knowledge has progressed to those vast facilities which we now enjoy in Freedom, Peace, Educational facilities, the rapid and cheap production of Books, Division of Labour by our complex Social arrangements, together with the wonderful developments of Machinery, Shipping and Railways to bring our food supplies from opposite parts of the world when Famine occurs within areas usually supplying us. These, with Electric Cables, Telegraphs (and Wireless Telegraphy), Telephones, Newspapers, the introduction of mechanical appliances and the finest scientific instruments for every desired purpose of observation, etc., together with thousands of other advantages we have in profusion, prevent the possibility of our adequately gauging the inestimable practical value to the earlier Egyptians, of finding the length of the Year, and the enormous difficulties they had to surmount before it could be determined.

Personally, until after repeated trials, I had but the faintest conception of the difficulties which would exist in that direction when only deprived of watch and compass. It seemed almost impossible to accurately determine what appears the easiest and simplest first step of fixing the mid-day position of the Sun. Though most people think they could thereby gauge

its true meridian South position, they would find that without local data or instrumental help as to the exact North and South directions it is most difficult to trace mid-day by direct inspection of the Sun's wide Circle through the sky, because we cannot thereby be sure at the right moment that it is at its greatest altitude—the curve is so great and the movement so gradual and the glare so dazzling.

The sticks and stakes erected for my experiments could not be relied upon as truly vertical, as slight inclinations to the east pointed their tops to the sun's expected mid-day position considerably before meridian noon, or *vice versa* inclinations to the west gave a misleading afternoon time.

To guard against risk three straight stakes of even length were fixed to keep each other steady, as a tripod, with the two front leg positions as near east and west as I could mentally gauge by the sun, and the back leg directed north to aid the eye in fixing the point of mid-day, but still there was such considerable danger of error that repeated attempts resulted in convincing me that such efforts were little better than guesses—no one of which could be depended upon.

Still struggling for a better means of solving this mid-day point, I watched at night for the pole-star to test the north stake, which, being out of line, was then adjusted to that star's direction and kept standing overnight. Near noon on the following day the pointings of the tripod gave a truer result, but still it was some minutes out.

Thinking to get a closer result with four stakes of equal length resting on a square whose sides were due north, south, east, and west, with their tops centred together over the centre of the square, a still greater advantage was noticed in the aid given to the eye by the guidance of the loophole-like tops of the east and west triangular pieces, whilst closer to the top of the stakes, the two which bounded the east slope lined to the eye in the sun's direction, as also did the two west ones. Further, the more solid quadruple top acted as a screen to the eye when sighting, which was further improved when a conical stone bottle was placed upon the stake tops to point the centre. It was then possible to sight the centre of the sun by means of the top rough triangular outline.

The whole shape of this advantageous arrangement suggested the outline of a pyramid. This still further strengthened my original idea that the pyramids were erected to trace the movements of the sun.

Then trying to re-consider (assuming that I had evidenced too much recent knowledge in placing the sticks on a truly fixed square with past local knowledge of the points of the compass by the exact north and south direction of my house) it seemed that still earlier and simpler methods were needed to test these

initial difficulties and enable us to find out and realize how the Pyramid idea would arise in the minds of the earlier ancient Egyptians and Mexicans. The tripod and four-stick arrangements used by primitive peoples, as Arabs and others, from which to suspend their meat and cooking utensils, etc., over open-stick-fires, indicated a most natural means, as when such tripods were not required over the fire they would often be standing near, on the ground fully exposed to the sun's rays, which would cast shadows gradually shortening in almost logarithmic ratio up to mid-day, and as gradually lengthening during the afternoon, and extending towards evening in the sun's opposite direction. These would be sure to attract attention and excite curiosity, and eventually serious study. In that way, more as a daily time indicator, or clock, the Pyramid idea would gradually develop, and as the increasing Summer and decreasing Winter lengths of these shadows were noted, the necessity for experiments upon a larger scale would be forced upon the more progressive people. Later, when passing through the Deanery Gardens on the north side of York Minster, and looking up at its impressive height of 235 feet, and grand proportions, the sun was seen over the central square tower. Sitting down to watch the circling jackdaws, I reflected on the astounding zeal, heavy labors, and self-sacrifice made by the men who built it nearly 1,000 years ago. I was reminded of the far vaster efforts of the Pyramid builders, whose solid masonry, covering 13½ acres, rose in perfect form nearly 500 feet (more than twice the height before me) and had lasted about 5,000 years (five times as long). A few minutes later I noticed the position of the sun had changed in the direction of the western tower. Then the idea that the Minster could thus be used as an eye-gauge by all persons living immediately north thereof, to measure and sub-divide the sun's daily track across the sky during sunny days like a clock, led to the thought that this would be one of the chief uses of the Pyramids. Accordingly I mentally tested the time-gauge advantage which might result from a high flagstaff being placed on the mid-diagonal point of the great Quadrangular Tower, with the stay-ropes falling in pyramid-arris-line slopes from the top of the pole to the Tower's four corners. That seemed to greatly aid the simple square-tower-gauge of the gradations of the sun's daily cycle. Still musing on this point, the towering 60 ft.-square column, 235 ft. high, stood before me, with its imaginary staff and rope-outlined pyramid top, appearing as an "obelisk," pointed to fix upon the sun's mid-day position. From this I derived the idea that Cleopatra's Needle and other OBELISKS of such immense size had been invented and erected AS TIME RECORDERS or SUN-DIALS at the entrances to Egyptian Temples, in the Court-yards of the Pharaohs, and Public Squares and Residences of their Nobility.

The fact that they generally appeared in pairs might be accounted for by the need for instant duplicate and simultaneous taking of the shadow measurements to more accurately trace the seasonal movements of the sun's constantly, yet regularly varying positions.

Anyone trying to do this, at any point, without a watch, will experience the difficulty of that task, and even with the aid of a watch candid observers will admit the necessity of an independent check upon measurements derived on such a relatively small scale in face of the sun's constant movement. From the more extended shadows of the pyramids I hope to later prove that the sun's altitude and varying distances from the earth could thereby be solved by proportional ratios, derived from the known distances and angles of the smaller pyramids which would be used as models.

Bearing these thoughts in mind when shortly afterwards called to London on parliamentary business, I decided to test my theory from the north side of St. Paul's Cathedral and "Cleopatra's Needle" (Obelisk), and found that the rounded rib-marked dome of that Cathedral, with its pointed top spire, enabled the eye to trace the sun's curved course far more easily than the square uncapped tower of York Minster had done. There I also realized the Pyramid keeper's advantage in having his entrance passage on the north (most constantly shadowed) side, so that he could observe the sun just above the Pyramid outline and avoid the too vivid light of the sun—so damaging to his eye-sight, just as I looked up under the edge of the shadow to the sun half-disced on the edge of the dome.

I wondered how many of the thousands of people daily passing the immediate north of St. Paul's had ever thought of gauging their daily time by sighting the sun's relative position above the dome. This called to mind the fact that the Vatican and Papal offices at Rome were placed North of St. Peter's—footing its shadows, which thus (irrespective of small dials) indicated to the Pontiffs and Prelates the daily times for service many centuries before clocks were invented. This called to mind the *exceedingly remarkable position* in which the Great Pyramid was erected for what I believe to be its *first great purpose* of *constantly showing the* **true time** *to all around.* Its position at the Southern apex of the large triangular delta-tract—as shown within the half-lines which enclose Lower Egypt (then *the* Egypt) on the attached Map—comprising the most fertile, extensive, and populous lands of Egypt, enabled its vast bulk and towering height of nearly 500 feet to be seen over that vast level area, as a clock-point to gauge the Sun's position: whilst the clear, dry climate helped the reflection of the Sun's rays from its polished sides, thereby showing with true gradations the time of day to all the people, the bulk of whom were slaves requiring food, etc., on a

large scale at organized times. Its other uses are further explained hereafter. These thoughts indicated that probably the Cathedral and Church Spires of to-day have been handed down to us from the Pyramids and Priests of Ancient Egypt.

Next journeying to Cleopatra's Needle, on the Thames Embankment, I was still more strongly impressed by its pyramid top with the idea that it also had been originally erected to show the time, though it seemed sadly out of place perched on a pedestal of the walled Embankment, instead of being in its old natural place on the ground of a geometric paved square where its shadows could be traced. We cannot restrict the ultimate effect of our humid climate upon its surface, but it seems almost a crime to hasten its destruction by fixing it in the centre of the smokiest and most acid air that could be found to eat its inscriptions away. I did not care to test its shadows or those of St. Paul's, as the courteous police might have shadowed my intentions and taken me for a "shady" person, more fit for the shades of an asylum, though I might have reminded "Robert" that his early ancestors used (before watches were invented) to tell their time for meals, etc., by turning their backs to the Sun and mentally gauging the lengths of their individual shadows, which in logarithmic ratio from wide steps to narrow regularly grew less towards mid-day, and as gradually lengthened towards evening from short spans to longer reaches. (See extract from 1712 Almanac, at the end.)

Cleopatra's Needle called to mind the three large pre-historic obelisks, locally called "Devil's Arrows," at Aldborough, near Boroughbridge, North Eastern Railway (see Plate of Vertical Stones), which I had often passed when cycling round York. Its close resemblance to the two taller "arrows" led to my visiting them on the following week-end. The fact that each one was orientated approximately to the four points of the compass along a line almost directly facing South, together with the further information there gathered that there were originally more of these huge stones, suggested to my mind that they also had been used to fix the Seasons and thereby the length of the Year, as they were so carefully placed (probably by the Druidical Ancient Britons) where it had required almost super-human power to quarry, fetch, and erect them. The absence of concrete or other masonry foundations below these Aldborough monoliths—rivalling those of Stonehenge in individual size (though not in number)—together with their rough, unfinished shapes, tell strongly against the assumption that they were erected by the Romans Their positions upon the slope of gradually rising ground appears intended to adjust the larger stones to their still greater height required to record the Sun's elevations.

DRUIDICAL AND OTHER "VERTICAL (SUN) STONES."

The legend that these "Devil's Arrows," weighing over 30 tons each, in solid blocks nearly 30 feet long, were thrown by Satan against the Romans who were introducing Christianity will not bear investigation. The dark sides in their history are the more instructive ones covered by their shadows, the study of which enabled the people to sow rough crops in due season, and migrate southwards before the winter set in, as it seems the tribes (or possibly only their elder Druids) assembled once a year during mistletoe-time at Stonehenge to concert joint means of defence, discuss general information (as they had no written records), especially their observations of the Seasons and the ever-present difficulty of finding the exact length of the year when counting by lunations. We know the "Order of Druids" assembled yearly at Stonehenge, and probably also at Anglesea, Aldborough, etc., in other seasons, and had a lunar month of thirty days. That, to my mind, accounts for the thirty upright stones in the outer circle at Stonehenge, whilst the *six to seven triplets* of stone (typifying three sub-divisions of the month into ten days each—their limit of count) forming the "GREAT ELLIPSE," *rising in height progressively* from EAST TO WEST, evidently point to the six moons (and a fraction) during which the days gradually lengthen from Christmas—their festal time—to Midsummer; after which the same monthly steps retrogress back in decreasing days and lengthening nights to the end of their year, during the whole of which time the elliptic shadows, as found in my experiments, would be traced by their great obelisk or "altar-stone"—hence the elliptic name and structural shape of this open-air Druidical temple or sacred place.

Further investigation of the geographical position of these Druidical stations disclosed the fact that Aldborough is 3° North of Stonehenge, whilst Anglesea is 3° West of that line. Again, the Druidical station in the Isle of Man is due North of Anglesea, whilst their corresponding South station from Stonehenge is found by the Druidical remains in Brittany (N.W. France); Dreux, their International place of assembly in Gaul, is again 3° East of Stonehenge, *thus clearly pointing to a systematic plan for Sun observations.*

These 3° differences in Longitude, etc., were $\frac{1}{120}$th of the earth's circumference, or $\frac{1}{30}$th of the Quadrant, and as they worked by the 30 days month this may indicate the line of research to re-discover the old system of Druidical Astronomy which probably assumed that as the Sun's movements appeared to be guaged in lunations. Nature's system of computation might be traced in $\frac{1}{30}$ths since the earth's revolution was about $\frac{1}{30}$th of the month, as shown by the phases of the Moon.

VERTICAL STONES, CALLED "DEVIL'S ARROWS," AT ALDBOROUGH.

The LOWER view from the North shows in perspective all the three stones in their Southern direction, with the Southern stone to the right of the tree; whilst the UPPER view is taken from the right of the middle "arrow" to show it and the Southern stone clear of the tree.

As a result of noting the before-mentioned 3° differences, I suggest that IT WAS BECAUSE THESE STONES HAD TO BE FIXED IN CERTAIN SELECTED PLACES WHERE THEY COULD BE FULLY EXPOSED FOR SUN OBSERVATION, that men had OF NECESSITY to secure the highest weather-proof blocks possible, and move them across the roadless tracts at the cost of most laborious efforts, protracted during long periods when the most primitive means of traction were almost unknown.

Primeval men did not excavate solid stone blocks, weighing over thirty tons each, and transport them so many miles—in the case of Stonehenge fifteen miles, and Aldboro' eleven miles—merely to erect them as stones for Worship or Stone-Gods. Had that been their object, it would have sufficed to use smaller stones of superstitious or suggestive shape, erected nearer the quarries, which were within districts offering more sheltered and healthier sites for habitation than the exposed positions in which we find them.

The real reason was that, in the course of progress, men had begun to increasingly realize the importance which a true knowledge of the Seasons had upon their earliest attempts at agricultural sowings, to which they had to resort to supply their growing numbers and secure greater safety and comfort to their race.

MONOLITHS.

Similar monolithic (solid block) stones, called "Sun stones," etc., have been found in most of the world's early habitable lands, and traced back to pre-historic times, idolatrous purposes being attributed to them. I believe, however, that they were intended for far more practical uses in the chronological work of developing that essential knowledge of the progress of Time which men were impelled to find out to ensure their Yearly food supplies and add to their means of sustenance—long before hewn-stones cemented or mortared together were used for larger blocks and buildings. Hence it was that they were compelled to dig out and erect these huge, rough, obelisk-outlined stone-blocks as large as possible the more effectively to trace the shadow variations through the Seasons, for lasting comparison through later years. Trees were continually growing and changing their shapes through stress of weather, and, as winds swayed them, their deflected shadows could not be relied upon; for like reasons poles erected could not be depended upon, whilst both had the fatal drawbacks of being perishable and readily destroyed in vengeance by their enemies. The needful work they were engaged upon was for the highest possible purpose they could think of in the interests of their race, and must therefore be inexorably permanent to withstand the ravages of time as well as the wrecking efforts of tribal warfare. True, it may be that they were afterwards worshipped by the lower natives, like other awe-inspiring objects, as emblems; but I submit that this was merely a secondary use, fostered by priestcraft to strengthen its powers over the people. The greater use was to enable the Druids to gain truer knowledge of the Seasons, to apply in the interest of the whole people as well as their own class. That gained them greater usefulness, and, consequently, greater power over their fellow-men.

Time (in all its phases of day, year, etc.) seems the great idea embodied in these stones, which were evidently selected owing to their durable nature to last the longest possible time; hence it seems strange that the restoration of that idea has taken such a long time to find out seeing that they typify permanent and comparative Time in the most emphatic way, as their shadows record it every day the sun shines.

It has already been explained that the sharp-pointed stones would of necessity be chosen or shaped to secure the easily-marked pointed shadows.

In the absence of Time-knowledge acquired from more advanced nations, the Ancient Britons and Druids had, by inference, to search out the Sun's movements as the cause of the Seasons, and trace their course from the Sun Shadows of these massive stones (their only available means) until they got practical results, to ensure reliance on which their records (probably stones or sticks marking the

tips of the shadows) would have to be tested in later years by the same fixed standards. Hence their own generation had a distinct incentive to erect the most substantial obelisks their energies and means could devise. They could not, however, from such relatively small obelisks have derived exact knowledge of the 365¼ days year, and therefore had only an approximation to the solar year, until the Romans invaded Britain and made known the length of the year as ascertained by the Egyptians, whose tremendous pyramid efforts had so long ago successfully found the term of the year in days by continuous tests and adjustments extending over many centuries.

The Earlier Egyptians, living under easier conditions of life, in a country peopled many centuries before Britain, would have all the well-known difficulties arising from jumbled Seasons, ripe and pressing for settlement during much earlier times, owing to the rapid growth of their population requiring increased and assured grain crops for food, within the restricted productive area of the Nile Valley. Their climatic conditions had long allowed of large communities dwelling together, profiting by their ancestors' discoveries, and by intercourse, etc., developing a higher civilization.

The ever-sure presence of the fierce sunshine in their cloudless sky emphasized that most prominent feature in their daily life, whilst at the same time it ensured those clear-cut, *constant shadows*, which I hold were so essential to that methodical and effective study of their systematic movements, which provided the most obvious means of tracing and recording the Sun's positional effect upon the Seasons and the cycling progress of the Year.

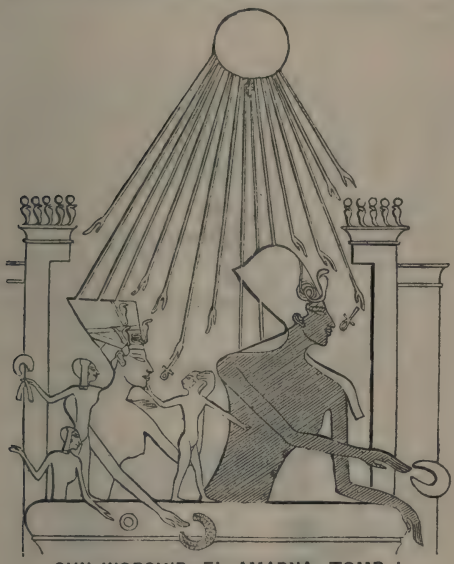
EGYPTIAN SUN-WORSHIP.

Their Sun-god "Ra" was adored all over Egypt as the most striking manifestation of the Supreme Creator of the World, especially at the earliest capital of Heliopolis—the On of the Bible. His name was always enclosed in the TWO horse-shoe-like RINGS OF MENES, which, as pictured on the following page, typify to my mind the growing range of the Sun's elevation from the smaller inner ring of Winter to the large outer Summer ring. The legend in these rings is always:—"The Sun-god of the two solar mountains—"the East (sunrise) and the West (sunset)—"whose name is the darter of beams, is in the "disc of the Sun."—(Osburn II., p. 330.)

The King was described as the direct descendant of the Sun, from whence his virtues and powers were derived by direct emanations from the solar disc, as shown forth by rays terminating in human hands projecting the symbol of life into the mouth and clasping the heart, infusing courage, wisdom, and justice. He was thus the High Priest

assumed to be in direct communication with the Sun-god. The head and crown of the Queen are likewise supported by these living effluxes or rays from the great source of physical light and life.

THE KING (HIGH PRIEST) AND HIS FAMILY WERE THE ONLY MEDIA BY WHICH THE SUN, AS THE SOURCE OF ALL BLESSINGS, DISTRIBUTED THEM TO THE PEOPLE; hence the Sun is shown over every picture of the King and his family thus:—



SUN WORSHIP—EL AMARNA—TOMB I.

The following is typical of the inscriptions appended to these pictures:—

"Thou shinest forth, O Lord beneficent, the "Sun-king, giving life for ever and ever, even "the living disc of the Sun; no guide goes "before thee; when thou emittest thy beams "all eyes see clearly. Now thou art rising, O "King, from the Mountains of the East, to "make perfect the life of man, and bird, and "beast; all things in the world glorify thee, "they are made strong by thy gifts, etc."

From the foregoing we know that practically all the blessings of life were thus attributed to the Sun, which consequently absorbed the foremost place in their thoughts, and therefore received the closest study of the Priesthood or wise men, who almost ignored the stars, which were too small, in comparison, to excite their imaginations, when from generations of experience they naturally concluded that the solution of the year's length so imperatively required to meet their purpose must be found in the Sun.

Progressive men were not likely to turn attention from the large Sun and Moon to myriads of barely visible stars, though the latter would be used as compass points during their desert journeys (mostly undertaken at night), and in later times came in for closer

study, and ultimately proved valuable guides in later Sun researches, when in tracing the Sun's path certain stars would be observed near sun-rise and sun-set during the various Seasons; *e.g.*, the re-appearance of the star Sothis in the morning sky was later taken as their sign for New Year's Day. But clearly this was the result of their efforts to trace the Sun's apparent movements.—Meantime similar protracted efforts enabled the Chaldeans and more Eastern nations to gradually evolve the 12 star signs of the Zodiac.

INDIAN SACRED SUN-STONES.

[By the kind permission of Sir John Lubbock, Bart.]

[and Messrs. Longmans, Green & Co.

The Chaldeans, in the same way, worshipped the Sun. It is also very remarkable that when the Spaniards found Peru, about the year 1525, the old style of Sun-worship was in its fullest sense the leading feature of Peruvian life, with its Priest-Kings reigning as the Children of the Sun, having hereditary, undisputed sway over the people. There, as in ancient Egypt, the main portion of the land was dedicated to the use of the Priests for Sun-worship, which we might more aptly describe as researches into the Seasonal positions of the Sun, and Festivals connected therewith.

The apparent preponderating power of the Sun outshone all other Seasonal indications to their minds, consequently they devoted their mightiest efforts and study in time to more clearly discern those movements upon which the Seasons depend, and by what means they might with certainty be traced in the future.

Readers will hardly need to be reminded that our very early ancestors used to worship and trace out the Sun's course, as proved by the name *Sun*-day as our first day of the week. Further, the name of the first month, January, is derived from "Janus," the mythical two-faced God, whose Eastern face was to watch the position of the Rising Sun. whilst its Western face watched over the Setting Sun—thus evidencing the Priestly interest in Sun research.

Ancient Sun-worship, as observed in Africa, Asia, Europe and America, appears to have had as its root-idea the study of the Sun's motion to trace the Seasons by recording the shadows of Vertical Stones, etc., which, despite the wide racial differences of men in all these quarters of the Earth, were of necessity conformed to secure this one natural requirement. Thus they are nearly all:—

1.—Monoliths of the largest size possible, with rough triangular pointed tops.

2.—Placed as vertical as men could devise.

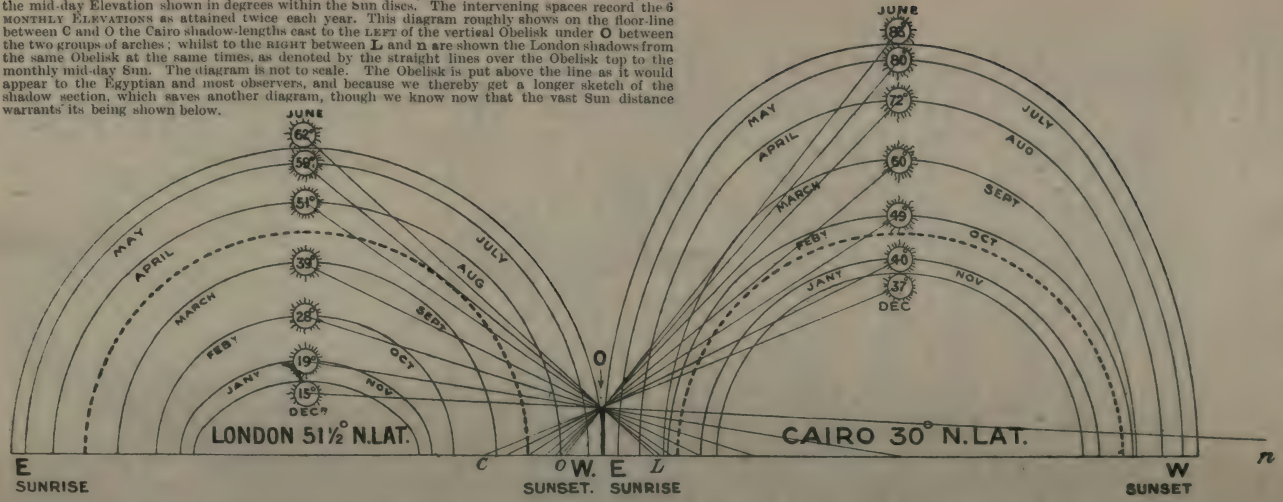
3.—Stones of the most durable quality obtainable.

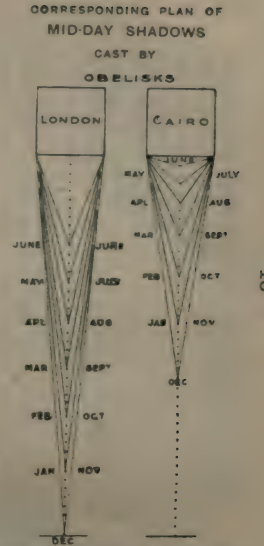
4.—Selected with four roughly squared sides.

5.—Orientated to North, South, East and West.

6.—At the great central points of observation (as on the opposite picture of the Indian Sacred Stones near Delgaum, in the Dekkan, India—from Sir John Lubbock's "Primitive Condition of Man") these stones are grouped on rising ground, to catch the full Sun's rays, and appear so arranged as to gauge the increasing elevations of the Sun during its 6 monthly (lunations) progressions from Mid-winter to Mid-summer, and its 6 monthly retrogressions to Mid-winter (see the 6 rows of stones gradually falling to the left). In

The Arches represent the Monthly Sun Elevations as they would be recorded each MOON, with the mid-day Elevation shown in degrees within the Sun discs. The intervening spaces record the 6 MONTHLY ELEVATIONS as attained twice each year. This diagram roughly shows on the floor-line between C and O the Cairo shadow-lengths cast to the LEFT of the vertical Obelisk under O between the two groups of arches; whilst to the RIGHT between L and n are shown the London shadows from the same Obelisk at the same times, as denoted by the straight lines over the Obelisk top to the monthly mid-day Sun. The diagram is not to scale. The Obelisk is put above the line as it would appear to the Egyptian and most observers, and because we thereby get a longer sketch of the shadow section, which saves another diagram, though we know now that the vast Sun distance warrants its being shown below.





(Fore-shortened to get within the page.)

Plate 4.—COMPARATIVE DIAGRAM of OBELISK SHADOW LENGTHS cast from the SUN'S ELEVATIONS on the 21st of each month at LONDON and CAIRO (see page 44.)—*M.B.C.*

this case, as also at Aldborough, etc., advantage is taken of the higher ground to add to the relative height of the larger stones to get the longest possible shadows.

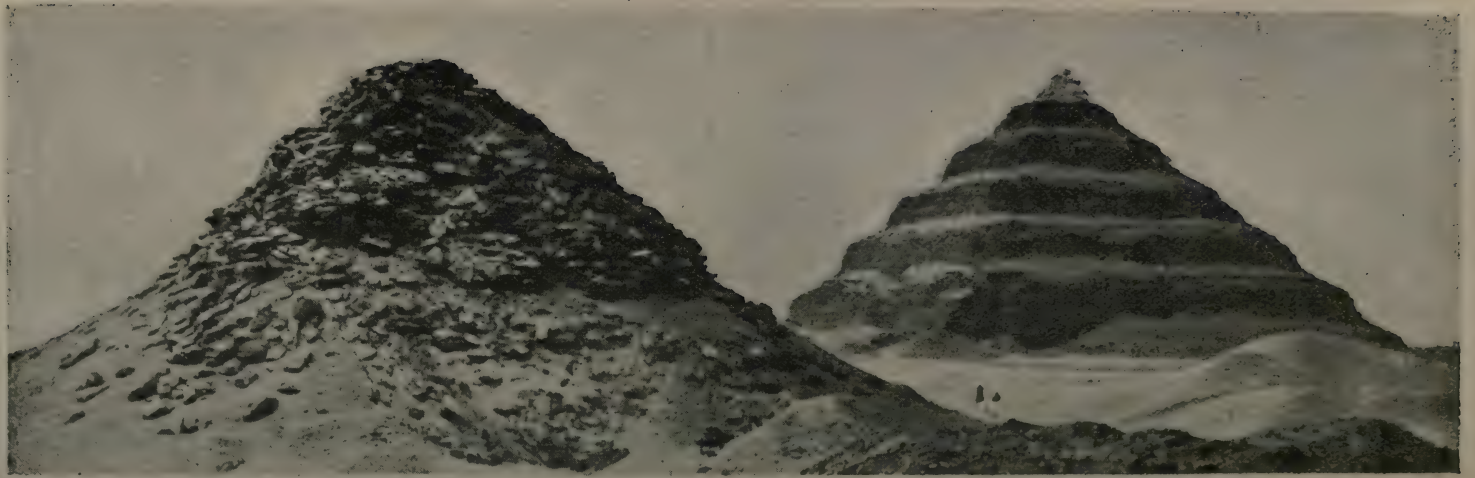
The Ancients seem to have been supernaturally impressed by the periodic appearance of their *Sun-God, who caused their Seasons*, as he apparently moved alternately to higher and lower positions in the sky to get wider North and then further South views over his realm in this world, and the doings of men. His path, as naturally gauged at the same fixed phases of the moon (whether at its full, half, or quarter stages), would appear like the arched courses shown by the diagrams opposite, for the fairly representative 30° and 51½° Latitudes given.

Their practical everyday interest appealed to them beyond mere superstition, and lay in discovering the true terms of these periods, to further their common welfare. They would certainly notice that the lower Winter elevations gave longer shadows from "vertical stones," etc., whilst, as the Sun rose higher, he seemed to peep over the tops of the stones and shorten the shadows till Mid-Summer. Thus stones of proportionately increasing size up to the full zenith of the Sun's power would tend to cast similar shadows, as, it is hoped, the reader may be able to follow, by the aid of the illustrations given.

The 12 lunations to the year would in course of time be found to be inadequate, as we now know that about 12¼ lunations of 29·53 days each make the Year. But these two irregular factors would be so extremely difficult to determine that their elucidation required the erection of far higher pointed erections to cast shadows of sufficient size to distinguish the recurring seasonal points of the Year. As they had already erected their largest possible stones, their only means of raising such erections—beyond rising ground—to greater heights was to pile large stones upon each other. Then, to fit these stones the better together, they would select square ones, dress off protrusions, and thus tool-dressed stones or clay bricks would be invented and used for higher buildings, as we find in the more Southern and earlier

PYRAMIDS OF EGYPT AT SAKKARAH,

which will be seen from the next page picture to be of the primitive style we should expect as a beginning. There the crude stone mound is followed by the larger terraced erection of the simplest workmanship, built of sun-dried bricks on a square base. Height, 196½ ft.; Base: N. and S. sides, 351 ft.; E. and W. sides, 394 ft. *This is the only pyramid wrongly orientated from the cardinal points, the North side being* 4° 35′ *East of the true North.* This imperfection, together with the irregular dimensions and extremely archaic inscriptions, point it out as the oldest large pyramid. Its *rectangular* base, although not so desirable as the "square" bases of the



By the kind permission of Mr. Frith, Author of "Lower Egypt and Thebes."

THE PYRAMIDS OF SAKKARAH—The "Step" Pyramid.

and Mr. Wm. Mackenzie, Publisher Edinburgh and Glasgow.

later pyramids, would still give the square-cut shadows they required, whilst its jagged edges would show Seasonal increases and decreases in the shadow protrusions.

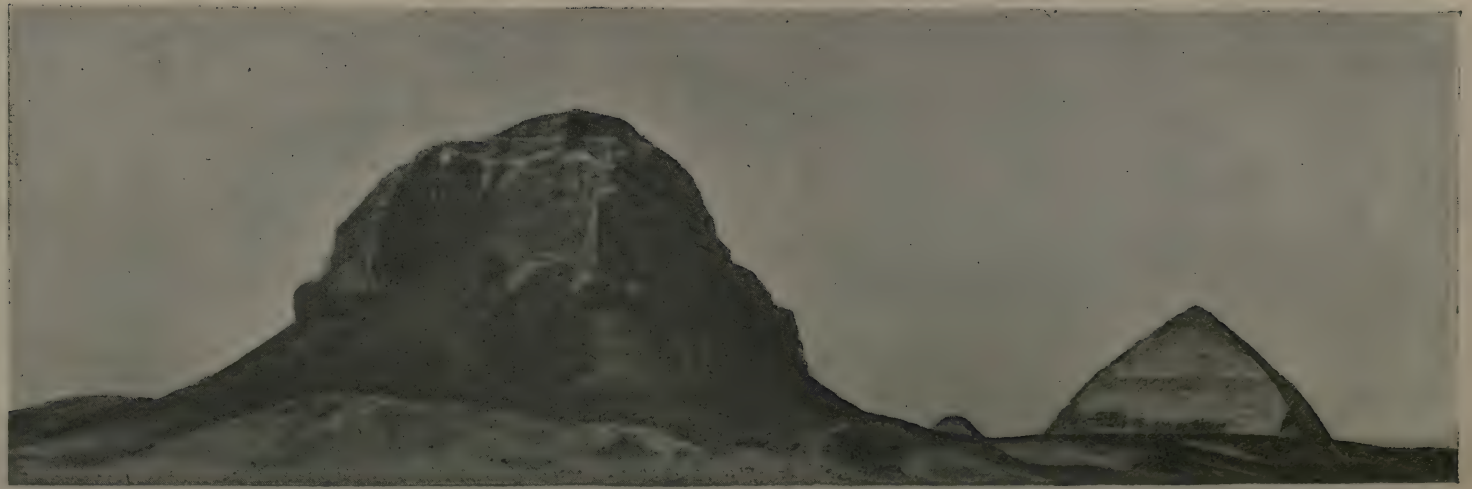
Below the pyramid is a gallery, with several passages of much later dates, showing that it was appropriated as a place of sepulture long afterwards, but still in ancient times. A very long lapse of time must have passed before it could thus have been diverted from its original use. Its outline indicates that originally its apex, now missing (but which the artist has added), would complete the 6 terraces, which I think were intended to represent the progressive slopes of the Sun's rays during the 6 monthly rises in the Sun's elevation from Mid-winter to Mid-summer, and the like 6 monthly lowerings back to Mid-winter, as already referred to anent Stonehenge and the Sun Stones of India. Similar styles are traceable in the Chaldean, Babylonian, etc., Temples.

There would be almost insuperable difficulty in fixing these slopes true to the Sun's mid-day rays for a series of years, because men had then only a crude approximate knowledge of the length of the year—probably then taken as 12 lunations = 354 days, which, being over 11 days per year short, would in 3 years throw each of the 6 step shadows one monthly step earlier, and so prove the basis wrong and their work futile, except so far as the longer morning and afternoon shadows directed their attention to the truer single "arris-line" of research, which then led them to design the pyramid sloping from base to apex, as shown in the

PYRAMIDS OF DASHOOR,

as pictured upon the next page, where it seems evident, from the slope of the pyramid to the right, that they first began with too steep a slope, which was partially rectified from nearly half-way up the slope. Possibly the upper slope may have been directed to the Winter Solstice and the lower one to the Equinox. The Southern Pyramid of unburnt bricks to the left has been despoiled for building material. It was formerly cased with stone, like other pyramids.

From the above-mentioned corrected slope at Dashoor, I argue that they gradually progressed Northwards to the truer pyramid form, mainly guided by the fact (as proved in my pyramid experimental shadows cast direct by the Sun—see Diagrams A, B, and C) that the nearer they approached the true π pyramid shape, the nearer the clear cut northern-shadow-edge, when recorded throughout the morning and afternoon respectively, assumed the shape of a straight-line, varying its daily position gradually, according to the Sun's seasonal elevation. These straightening lines would probably be their chief guide towards securing the exact Mid-day Equinoxial Slope requisite in the best possible style of Pyramid. In following up the study of these lines, they would



By the kind permission of Mr. Frith, Author of "Lower Egypt and Thebes,"

THE PYRAMIDS OF DASHOOR.

and Mr. Wm. Mackenzie, Publisher, Edinburgh and Glasgow.

develop their pyramid series to the position in which we find their most complete result in the Great Pyramid at 30° N. Lat., where the Sun's Equinoxial elevation was consequently 60°, from which degree factors arise those wonderful results we find in the Great Pyramid proportions.

The Ancient Egyptians had none of the finely graded circles, telescopes, etc., we use for accurate observations; they had not even smoked or dulled glass through which the eye could see the truer disc of the Sun, hence they could not take direct Sun-observations by our methods, but had to resort to the indirect method of studying Sun-shadows to gain their Astronomical knowledge. That was the reason why their instruments (pyramids, etc.) had to be so huge to get truer results, when their sub-tended distance and angle measures from the pyramid's apex to the ground were relatively so small in comparison to those extended from the pyramid to the Sun.

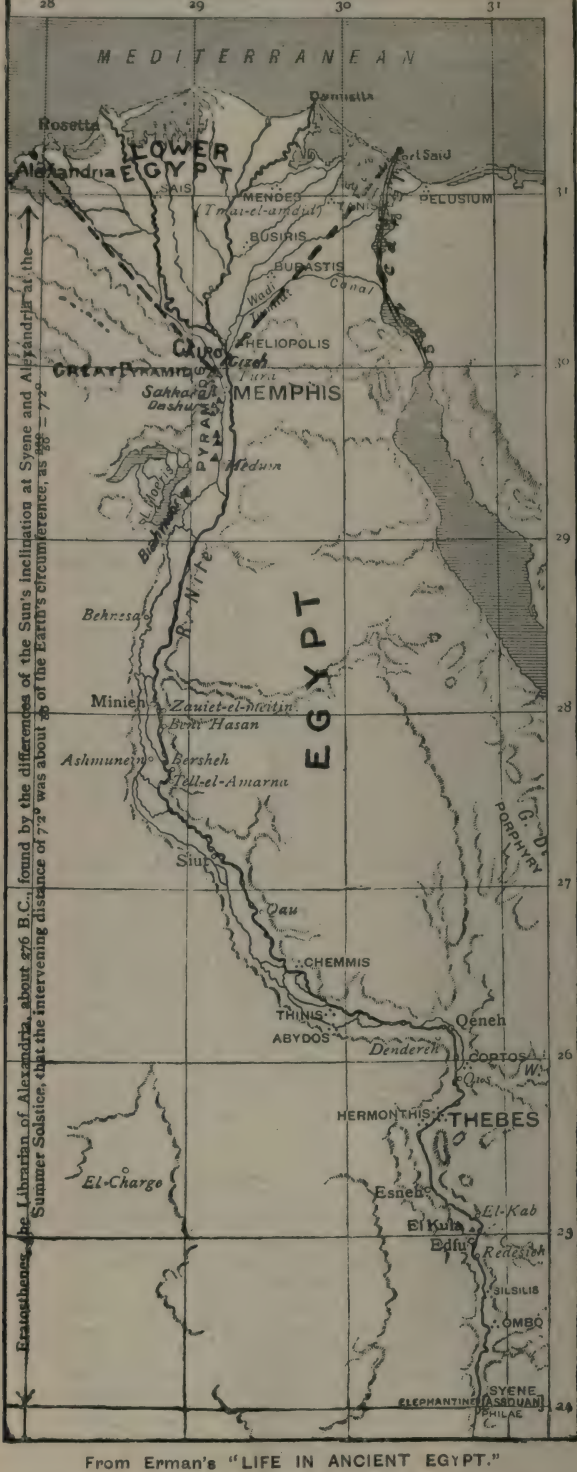
The practical solution of the *squaring of the circle, or ratio of the diameter to the circumference of a circle* (as 1 is to 3·1415926, known as π) in the pyramid measurements, has been looked upon as evidencing a most marvellously developed mathematical knowledge in those early ages. But it by no means follows that the erectors knew this central fact of mathematics, *as a number*, to any such fine accuracy, although they had got very near it by the geometrical demonstrations they had constantly to use in astronomically working out their results from pyramid shadows.

Most Egyptologists agree that the earliest Egyptians had a very crude and cumbrous style of arithmetic, with which they could hardly have worked that problem out. Indeed, I am convinced that they did not require to do so, and it is quite likely they did not know the great factor π as the refined measure of ratio, although they were unconsciously working upon it. The simple fact was, that their pyramid-shadow experiments to measure the year's length had, in their efforts to find the right pyramid slope, gradually developed up the 70 miles line, near which we find the pyramids were built, as per map on the next page, between 29° and 30° N.

During the many generations which passed away whilst these determined attempts were being made to solve the year's term by means of pyramids, it was almost impossible for the designers to determine the right inclination for the sides of the perfect pyramid required. At first they could not find the Solstice and Equinoxial points, because the Sun always appeared to be moving, and through not knowing the length of the year, they could not be sure until too late that it had passed those phases. The prevailing early

MAP OF EGYPT.

N.B.—The series of Pyramids are situated in an almost direct meridian line South of Cairo. This map is also interesting as showing the Alexandria to Syene limits by which Eratosthenes obtained the first measure of the earth.



From Erman's "LIFE IN ANCIENT EGYPT."

(By the kind permission of Messrs. Macmillan & Co., London.)

tendency to hang upon the shorter 12 lunations as the year, would cause them to assume that the Solstice or Equinoxial points were several days earlier than really was the case, because their lack of high erections prevented their measuring the shadows fine enough to get exact results.

At first they seem to have aimed the slopes of their pyramids more to the Summer Solstice, or point of the Sun's highest elevation, as the earliest and most Southern ones at Sakkarah and Medum have slopes of 74°.

At Dashoor, the slopes of 43° seem diverted more towards the Winter Solstice. Afterwards, the more perfect forms at Aboosier and Gizeh in the North, ranging between 51° and 52° angles, are directed to the Equinoxial points, as may be seen from the following page of pyramid sections, which, with others, are reproduced by Professor Smyth's kind permission.

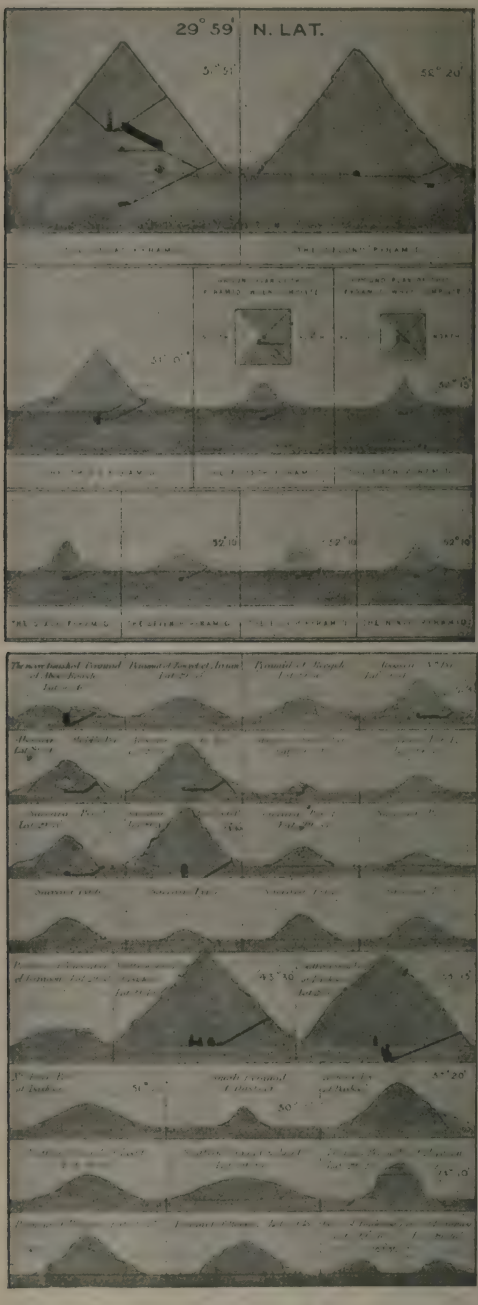
From these, it is reasonable to conclude that different ideas at first existed as to which point of observation was the best standard to take. They did not know which to take. Then, after testing the two extremes, experience seems to have directed them to adopt the central Equinoxial basis of research for future efforts in their great and useful year-finding purpose.

Meantime they would, no doubt, have gained some truer knowledge of the year by those earlier efforts. Each successive nearer approach to a solution of the true length of the year would add confidence to their endeavours towards securing their people from famine, by finding the true times for sowing. In that way, from a national point of view, they would be encouraged to greater works towards securing those greatly desired final and lasting benefits.

The sections upon the following plate show the slopes of the pyramids as they were probably developed from the older Southern pyramids to the most complete (Great Pyramid) type at the extreme North of their line. These, whilst evidencing gradual progression, show that *the greatest difficulty was to find the true slope*, to prove which we need not go further than the incontrovertible fact that the so-called Second Pyramid has an angle 29′ *greater* than the adjoining Great π Pyramid, whilst the Third Pyramid's angle is 51′ *less* than π angle. From these, I argue that their designers' prior efforts having demonstrated by shadows that the angle of the "Second" was *too large*, and that of the "Third" *too small*, they would, by continuous experiments, be enabled to determine that mean between these two which gave the true slope requisite to perfect their final effort when building the Great Pyramid, which, instead of being the "*First*," was really the "*last*" built—hence we should read their numbers in reverse order. Probably the name "First" has been given to it merely because it is the "first" and greatest one usually seen by travellers, who nearly all approach from Cairo.

SECTIONS OF THE PYRAMID SERIES.

NORTH TO SOUTH.)



From "OUR INHERITANCE IN THE GREAT PYRAMID."

(By the kind permission of Professor Piazzi Smyth and his Publishers—Messrs. Chas. Burnet & Co., London).

SECTIONAL VIEW OF PYRAMID DEVELOPMENT.

The most reliable Egyptologists and Archæologists who have investigated the structure of pyramids now agree that the Southern pyramids of Medum and Sakkarah are considerably older than the Gizeh group to the North. Further, the later improved style of building shown in the *passages to the Tomb vaults* under the pyramids, proves that such passages (*which must not be confused with the original pyramid North Entrances*) were constructed in later times, after particular pyramids had been replaced by others of more perfect shape for Sun observations; hence the dates affixed by, or assigned to, those Tomb-finding-usurpers cannot be taken as criterions of the ages in which the respective pyramids were originally built, although the names of the leading persons thus later buried in some of the larger pyramids were, by common usage, subsequently applied as names for the respective pyramids, as explained further on.

The vertical pyramid sections opposite (looking West) outline and compare the ancient size and shape of the series of pyramids raised by the Egyptians when cautiously "feeling their way" towards the *ideal position* for their Observatory at 30° Lat.——**The combined wisdom of our scientists to-day could not anywhere select a more suitable district for astronomical purposes than the sandy plain, South-West of Cairo, fixed upon by the pyramid builders. The superbly clear climate there, where clouds never appear to obstruct the view, ensured the most favourable conditions possible for uninterrupted observation and record.**

Those early men's primitive knowledge and means of observation could not possibly have enabled them at the outset to have DESIGNEDLY fixed upon the three essential factors—(1) The *exact moment* of the Sun's Equinoxial transit, (2) The *exact slope* or elevation at that moment, (3) The position on the 30th parallel of Latitude. —It is quite inconceivable that they could have ACCIDENTALLY complied with those conditions, which all history proves were only attained by great efforts, after repeated failures.

Wrong estimates of the Year would hinder their finding its real length, by leading them to mistake for the Equinoxial days, earlier or later dates, which gave misleading Sun-elevations then taken as the inclination for the pyramid slope. The consequent varieties of slope would hover near the truth, in some cases being *less*, and in others *greater*, than the true elevation.

History records that the "Style" (slope) of the Sun-dial, fixed 263 B.C., *in the public square of Rome (which was then the centre of civilization)*, was 4° wrong, yet that wide error, so publicly displayed, was not discovered until about 100 years later.

We may therefore well concede that the Egyptians, living probably 3,000 years earlier, could but slowly adjust their pyramid errors of slope, which were so extremely difficult to get true, owing to the complicated factors of their problem, when they lacked definite data. They had to depend upon most crude and tedious methods of research to gain experience, and were retarded by those conflicting opinions which always hampered the earliest investigators.

Probably the Egyptians worked on the idea that their favoured land was the centre of the World, and they hoped by pyramid experiments to trace the central point for all their astronomical observations.

They naturally believed the world to be flat, —not having any idea of its being a sphere. That thought was not evolved until thousands of years later. (It is astonishing to find how very recently our Solar information was discovered.—*The discoveries of the Greeks* ARE NOT HALF AS OLD *as the pyramids.*—It is only about ten years ago that the variations in the Sun's apparent diameter were noticed, which led to the amended Sun distances, etc.)

We can hardly fathom the extreme difficulty the early Egyptians experienced in finding out and building these pyramids true; but the more we realise the great drawbacks under which they laboured through lack of the knowledge and methods we are privileged to possess, the more we shall admire and value the purpose they had in view and the zeal with which they accomplished these vast and then useful works.

The almost insurmountable difficulty of finding the exact Equinoxial π slope, *before true methods of time were known*, could only be overcome in slow stages, by the aid of experience derived from the progressive development of such an inevitable series of pyramids as we find in Egypt.

From the fact of their keeping so near to the original Sakkarah meridian, it seems evident that the designers believed they were near the right line, and that, as the defects of their earliest efforts appeared to be caused by their failure to find the true position and mark the exact Equinoxial point, they sought in later efforts to get better results by amending the positions and slopes of their pyramids.—Thus the series of pyramids, varied and improving in shape and location, would progress, as the builders were encouraged by their increasing measures of success in gauging the Year.

A glance at the pyramid sections upon an earlier page shows that all the more perfect forms of pyramids had a Northward passage, which thus conclusively

proves they were all built for one uniform object of absorbing national interest, which, I believe, was to find the true length of the Year.

Underground North Passages.

Here we trace those mysterious underground passages which, I believe, were primarily designed to secure a more stable and adequate guide towards fixing their pyramid base-lines due North, South, East, and West, than they could trace by their crude instruments direct from the Sun, which appeared to be constantly moving. They realized the vital importance of that square-setting to ensure perfect observation shadows; hence, when later they had noticed that what we call the North Polar region of the night sky remained almost constant in the opposite direction to the mid-day Sun, they conceived the idea of constructing those telescopic galleries, *all* pointed to the North, **to find the direction of the "Meridian Line."** From that, by "T-squares," etc., the required N.S.E. and W. compass points would be found to lay down the foundations of the pyramids with their base-lines truly orientated, as we find them.

By finding the "Meridian Line" the first firm step in Sun-observation was secured, as thereby the mid-day shadow could be decisively fixed upon as a basis for sub-dividing the day and grading the Sun's mid-day elevations.

Reference to the Vertical Section of the Great Pyramid shows that these entrance passages, with their retiring chambers, gave the great additional convenience of not only affording shelter for night observations, but also of enabling the pyramid-keepers to remain in the shade between their day-time gauges of the Sun, whilst during the Winter months they could actually record upon the North-floor the lengths of the governing shadows within the shade of that North-side of the pyramid.

During the Summer months, the keepers would require to record the daily development of the North edges of the shadows (as shown in Figures C_1, C_2, and C_3, and explained further on). To do that with greater ease and accuracy, their standard point of observation was designedly placed about 50 ft. up the Northern slope of the pyramid, near the centre of its breadth at that height, so that the observer could from thence note the direction of that controlling shadow-line, as it appeared so easily graded beyond the edges of the N.E. and N.W. "arris-ridges" of the pyramid, which, by their casing-stone joints, would thus admirably serve as register pointers.

The difference between the stretch or *reach* of the early morning and late evening shadows, as shown upon diagrams A, B, and C,

probably accounts for the fact that the passage is not fixed quite in the centre, but at the best point to trace the main *reaches* on both sides.

Had the designers merely required an inclined gallery or tube through which to watch the Northern Stars, *they would have attained that object far more quickly and easily by beginning at the ground level*, and boring down the required incline into the easily worked sandstone rock, as indeed they have done for nearly three-fourths of the length of the passage. *From this, it is clear that the pyramid was not merely needed for star observation, as that only required the passage tube to aid the eye.*

There must, therefore, have been a definitive purpose outside these Northern Star observations to cause them to put the entrance 50 ft. above the ground, and not in the centre, and that, I submit, was to get this "coign of vantage" up the side of the pyramid from which their observation of the shadows could best be sighted over the outlying edges.

The peculiar vertical grooves between the key-stones arching this entrance passage seem designed to serve as sighting-lines for direct observations of the Sun above the pyramid's sheltering edges, which would provide the then best means of direct Sun inspection.

These "passages or galleries" were also used during the building of the pyramid (as the late Mr. Procter pointed out) for testing, by water-level-reflections, that the masonry courses were horizontal throughout, to ensure that uniformity of slope which would secure the Apex being truly vertical, and the pyramid the right height.

From the foregoing, we may see that these "sighting tubes," or passages, played an important part in the construction of the pyramids, and that their first use was to guide the designers to orientate the pyramid sides due N.S.E. and W. respectively.

The accuracy of pyramid observations depended upon the true orientation of the structure and the exact slope required for the pyramid, as will be seen when we come to the explanation of Diagrams A, B, and C, which also indicate how the pyramid series would arise from progressive efforts to find the perfectly shaped π pyramid.

If the early Egyptians could have foreseen that their people would have to build such a vast series of pyramids to find the Solar Year, they would have been appalled by the magnitude of their task, and discouraged from beginning it. **But from the very nature of their problem, they were led on, step by step, buoyed up by the zealous hope, as each new pyramid was begun, that it would finally settle the vital and ever-present Year problem of their day.**

The pyramids seem expressly designed to establish and perfect the Egyptian estimate of the Year by the study of Sun-shadows.

Careful study of pyramid slopes and Sun-shadows (viewed in the light of the limited knowledge possessed by the pyramid builders, and the difficulties they had to contend with) shows how very easy it was for them to be sanguinely led on to successively greater efforts, and why their utmost energies would readily be devoted to solve that greatest point of knowledge and most practical necessity of national and social life,

THE NEED OF A COMPLETE AND UNIFORM SYSTEM OF TIME,

which became a *prime necessity* as the population developed, and has ever since increasingly absorbed the interests of men.—The more we consider the value of Time the more fully we shall be convinced that TIME is the most important factor of life, and a realized knowledge of it is a first requirement which must be sought out.

The length of the Year is the great natural unit.—Our lives are measured by it.—Our Yearly food depends upon agricultural efforts made in TIME (Seasons).—Our meal times, business, etc., in fact, all the organizations of our daily life, are founded upon TIME, which is so conveniently subdivided for us by the clocks and watches, so common to us all, that we fail to realize how imperative it was that the originators of civilization should evolve a system of Time acceptable to all.—Though they had not trains to catch at given times, they had their regular boats up the Nile, and military, civil, social, etc., organizations to arrange.

Methods of Time-knowledge were not given to early men complete, but had to be developed by long experience, and thought out after patient experiments, when that need became more pressing as the population increased.

As their condition improved, imperfect or varying ideas of Time had to give place to a better system. Their leaders or rulers had to invent a system, when they had not inherited the right one.

Those who can reign down their thoughts to the level of the conditions governing primeval Egyptian life, so far as they have been re-discovered to us, cannot admit that it was at all likely that the early Egyptians could have conceived the idea of finding the Year's length by the Stars, much less could they have given effect to it until the Zodiac, etc., were developed, at a much later period.

To see how absurdly improbable is such a supposition, we have only to gaze at the countless multitude of Stars on a clear night, and reflect that, despite all the advances of science and publication of knowledge, not one person in one thousand can to-day name three or four of those Stars in position.

Is it possible to concede that the primitive men of 5,000 years ago could do even that? Decidedly not. For we remember the myriads of Stars are constantly changing their positions from our fixed points of view, and that the study of their motion requires the highest range of human thought, and would only become possible as a system of regular observation and record dawned upon men, who, be it noted, took many centuries to develop the most elementary system of writing.

In all probability they would be entirely depending upon the Sun and Moon until large populations gave rise to early commerce. Then, very gradually, short-range-travelling would begin, and men crossing the desert at night would have their attention fixed upon some star visible in the direction they were going; but many generations would pass before a systematic idea of the relative stellar positions could be formed, as the star movements were too complicated for them to unravel.

We need to bear in mind that, although our Seasons in the Temperate Zone are marked by

Falling Leaves in Autumn,

Naked Trees or Frost and Snow in Winter,

Budding Trees and Vernal Plants in Spring,

almost perennial Summer exists in the Semi-Tropical climate of Egypt, where their most marked sign, the Inundation of the Nile, does not come on a fixed week in the year, but varies several weeks. This year it is about three weeks *late*, and other years may come *early*.

But, after all, although the Seasons are so marked with us, they only give a very indefinite idea (within a few weeks) as to when those Seasons begin, because our Seasonal weather varies.——It was impossible to accurately fix the limits of the Seasons by such unstable data, which could not indicate the length of the Year any nearer than the more obvious 12 moons (or 354 days) per year had done so imperfectly as to repeatedly mislead the people's idea of the times in which their Seasonal routine work should be done. That being so, they still had to struggle on and mend their estimates of the Year as best they could, by the puzzling experiences through which they passed.

During all those centuries which elapsed before even the 360 days' Year was found out, the need of a fixed Calendar (*i.e.*, Table of Days) would be felt more strongly as the minds and wants of the people increased. The first rough lists of days would frequently be patched up and adjusted, until they were developed into Calendar form: but the ordinary natural indications of the Seasons were so gradual and interwoven that the transition from one Season to another was hardly perceptible.

The best observers failed to trace the precise Season lengths, and so the length of the Year could not, from men's notice of nature's traces

in plant life, etc., on the earth's surface, be found to within a few days.

All efforts to trace the number of the days in the Year by purely Seasonal signs gave imperfect and varying results, interchanging between shorter and longer estimates, which proved so unreliable that men were compelled to seek out the Year's term by the surer means which were found in the Sun-shadows which marked the daily courses of the Sun's Seasonal path.

Fortunately for us, the Almanac keeps us correct, and shows exactly, day by day, how the year is passing.—That great Almanac advantage the earliest Egyptians lacked.

The question inevitably arises, where is the connection between PYRAMID SHADOWS, TIME, and the LENGTH of the YEAR?

To answer that fully to the general reader requires more than mere words; in fact, the best written description, even when accompanied by the best illustrations obtainable, would fall short of that full portrayal of ideas which a practical notice of the development of Sun-shadows cast from a series of models alone can convey; hence, part must be left to the imagination of the reader, guided by the Tables, Diagrams, etc., shown within our present limited space.

We therefore start our investigations with the obvious facts—

1. That directly men began to cultivate crops, they must of necessity have roughly observed the Seasons, the neglect of which would quickly be brought to mind by failing crops.
2. Observation of the Seasons would show, by the variations of the Sun's heat and length of daylight, that the Seasons depended upon the apparent relative positions of the Sun.
3. Next to the vivid Sunlight, the most noticeable feature of the Egyptian climate is the heavy shadows cast by the Sun from the buildings, etc. These, constantly moving every day in response to the direction of the Sun, must have pointedly drawn attention to the connection between cause (the Sun) and effect (the shadow), and thus inevitably have led men to first seek out the recurring Yearly Seasons, by tracing the Sun's Seasonal movements by its most distinctive shadows.

To more clearly focus the mind upon those astronomical factors which are most readily seen by unaided eyesight to indicate the Seasons, I have prepared the following Table, which details what are herein called—

"THE NATURAL GAUGES FOR THE SUN."

Date 1899	24 hours at London divided (to the *nearest* hour) into DAY and NIGHT		Equation of Time, adjusted to the *nearest* second.	Sun's Declination at Mean Noon, adjusted to the *nearest* minute.		Sun's apparent noon elevation to the *nearest* degree at Cairo 30° N.		SUN-SHADOW LENGTHS cast at London in units of the length of the pole or erection, as per the Travellers' Almanac for 1712. noon.	9-0 a.m. and 8-0 p.m.	6-0 a.m. and 6-0 p.m.
							London 51½° N.			
	hrs	hrs	m.s.	°	min.	°	°	units	units	units
Jan. 1	8	16	3 47	23	0	37	16	3·60	9·72	
6	8	16	6 4	22	30	38	16	3·41	8·63	
11	8	16	8 10	21	48	38	17	3·21	7·60	
16	8	16	10 1	20	55	39	18	3·00	6·69	
21	9	15	11 34	19	53	40	19	2·79	5·89	
26	9	15	12 47	18	41	41	20	2·58	5·18	
Feb. 1	9	15	13 49	17	4	43	21	2·39	4·59	
6	9	15	14 18	15	35	44	23	2·21	4·08	
11	10	14	14 27	13	59	46	25	2·05	3·66	
16	10	14	14 17	12	18	48	26	1·89	3·29	
21	10	14	13 49	10	31	49	28	1·76	2·98	
26	11	13	13 5	8	41	51	30	1·63	2·71	
Mar. 1	11	13	12 32	7	33	52	31	1·51	2·47	
6	11	13	11 26	5	38	54	33	1·40	2·27	
11	11	13	10 11	3	41	56	35	1·30	2·09	
16	12	12	8 48	1	42	58	37	1·21	1·94	
V 21	12	12	7 19	0	16	60	39	1·13	1·81	18·17
26	12	12	5 47	2	14	62	41	1·06	1·69	12·18
Apr. 1	13	11	3 57	4	34	65	43	0·99	1·58	9·22
6	13	11	2 28	6	29	66	45	0·93	1·49	7·43
11	14	10	1 5	8	21	68	47	0·87	1·40	6·23
16	14	10	0 11	10	9	70	49	0·80	1·33	5·43
21	14	10	1 19	11	53	72	50	0·77	1·27	4·81
26	14	10	2 15	13	32	74	52	0·73	1·21	4·36
May 1	15	9	3 0	15	6	75	54	0·69	1·16	4·00
6	15	9	3 30	16	33	77	55	0·69	1·17	3·73
11	15	9	3 46	17	54	78	56	0·63	1·08	3·51
16	16	8	3 48	19	7	79	58	0·61	1·06	3·31
21	16	8	3 36	20	12	80	59	0·59	1·03	3·21
26	16	8	3 11	21	8	81	60	0·57	1·01	3·12
June 1	16	8	2 26	22	4	82	61	0·56	0·99	3·04
6	16	8	1 36	22	40	83	61	0·56	0·99	3·04
11	16	8	0 38	23	6	83	62	0·56	0·99	3·00
16	17	7	0 25	23	22	83	62	0·56	0·99	3·01
21	17	7	1 29	23	27	83	62	0·56	1·00	3·04
S 26	17	7	2 33	23	22	83	62	0·56	1·01	3·12
July 1	17	7	3 34	23	7	83	62	0·59	1 03	3·21
6	16	8	4 28	22	42	83	61	0·61	1 06	3 35
11	16	8	5 14	22	7	82	61	0·63	1 08	3·51
16	16	8	5 49	21	22	81	60	0·66	1·12	3·73
21	16	8	6 10	20	29	80	59	0·69	1·16	4·00
26	16	8	6 17	19	27	79	58	0·73	1·21	4·36
Aug. 1	15	9	6 7	18	1	78	57	0·77	1·27	4·81
6	15	9	5 42	16	42	77	55	0·82	1·33	5·43
11	15	9	5 2	15	16	75	54	0 87	1·40	6·23
16	15	9	4 8	13	44	74	52	0·93	1·49	7·43
21	14	10	3 1	12	7	72	51	0·99	1·58	9·22
26	14	10	1 42	10	25	70	49	1·06	1·69	12·18
Sept. 1	14	10	0 5	8	17	68	47	1·13	1·81	18·17
6	13	11	1 42	6	26	66	45	1·21	1·94	Too
11	13	11	3 25	4	33	65	43	1·30	2·09	long to
16	13	11	5 10	2	38	63	41	1·40	2·27	record.
21	12	12	6 56	0	42	61	39	1·51	2 47	
A 26	12	12	8 40	1	15	59	37	1·63	2·71	
Oct. 1	12	12	10 19	3	12	57	35	1·76	2·98	
6	11	13	11 51	5	8	55	33	1·89	3·29	
11	11	13	13 2	7	3	53	31	2·05	3·66	
16	11	13	14 22	8	55	51	30	2·21	4·08	
21	10	14	15 18	10	43	49	28	2·39	4 59	
26	10	14	15 57	12	28	48	26	2·58	5·18	
Nov. 1	10	14	16 20	14	27	46	24	2·79	5·89	
6	9	15	16 14	16	1	44	23	3·00	6·68	
11	9	15	15 52	17	27	43	21	3·21	7·60	
16	9	15	15 7	18	46	41	20	3·41	8·63	
21	9	15	14 1	19	56	40	19	3·60	9·72	
26	8	16	12 35	20	58	39	18	3·76	10·79	
Dec. 1	8	16	10 50	21	50	38	17	3·91	11·73	
6	8	16	8 49	22	31	37	16	3·97	12·38	
11	8	16	6 36	23	1	37	16	4·01	12·64	
16	8	16	4 13	23	20	37	15	3·97	12·38	
21	8	16	1 45	23	27	37	15	3·91	11·73	
W 26*	8	16	10 45	23	22	37	15	3·76	10·79	
31*	8	16	13 12	23	6	37	15	3·63	9·93	

Add to Apparent Time. Subtract from Apparent Time. Add to Apparent Time. Subtract from Apparent Time.

South of Equator. North of Equator. South of Equator.

*Increases after Dec. 21st. *Begins to add on Xmas Eve.

Too long to record. See page 16 for range of straight-line-shadows cast from the London Sun Elevations *to the right* from *L* to beyond *n*.

Old "Yuletide" marked the "Winter Solstice" —*i.e.*, the shortest day, or "start of the New Year," which the Roman Catholics still begin on Dec. 25th (for Ecclesiastical purposes only).

(V) Vernal Equinox, March 20th
(A) Autumnal Equinox, Sep. 23rd
(S) Summer Solstice, June 21st
(W) Winter Solstice, Dec. 22nd

NATURAL GAUGES FOR THE SUN.

On the opposite page is recorded in tabular form the data by which the earliest men would most obviously trace the Sun's seasonal positions — long ages before astronomical attention was directed to study the stars, which were subsequently located when the Zodiac was developed.

DATE COLUMN.

The first column records the dates for each five days from the first day of each month, as was often shown in old Almanacs, and is still continued in the Nautical, etc., Almanacs, to gauge the graduated lengths of daylight, etc.

This *fifth* day Calendar is an interesting survival of the ancient system of recording in *fifths*, and enables me to reproduce in the last three columns the full datal list of shadow-lengths, so conspicuous in the Traveller's Almanac of 1712 and earlier dates.

By adopting these 73 dates, a "bird's-eye view" of the Year's data is condensed and displayed upon our limited page.

From the earliest ages, the succession of the Seasons was seen to be connected with the apparent Sun.—It was self-evident that in Summer the days grew longer, until the Sun reached its *highest* elevation at the SUMMER SOLSTICE (21st June, the *longest* day); then, from that point, the days were shortened, until, in Winter, the shortest day resulted from the Sun's *lowest* elevation at the WINTER SOLSTICE (Dec. 22nd).—These Solstices are respectively indicated by the *heavier* horizontal lines **S** and **W.**

The EQUINOXIAL DATES of *equal day and night* are shown by the *lighter* horizontal lines, (**V**) for VERNAL (March 20th) and (**A**) for AUTUMNAL EQUINOX (Sept. 23rd).

The two columns, headed "London 24 hours, divided (to the *nearest* hour) into Day and Night," show that, following and consequent upon the elevations above referred to (and detailed in columns 6 and 7), we get the varying sub-divisions of the 24 hours into their

RELATIVE DATE-LENGTHS OF DAY AND NIGHT.

The hour figures are derived from the times between Sunrise and Sunset for London's Latitude, which was the best known fixed point I could take.

These will be noticed to be *equal near the Equinoxial cross-rules* **V** and **A,** whilst at the Summer Solstice (**S**) the DAY has 17 hours to the 7 hours of the NIGHT. From that time, the days decrease to 8 hours and the nights increase to 16 hours at the Winter Solstice (**W**), when during two-thirds of the 24 hours the Sun is below the horizon. Then the days again begin their increase, which culminates in the following year's Summer Solstice.

But the ancient peoples, in taking these varying lengths of the day as their first indicators towards finding the rotation of the Seasons and Year's length, could not fail to notice that in different Latitudes the Seasonal phenomena varied.—When compared with our differentiated Seasonal indications in the Temperate Zone, Seasons can hardly be said to exist at the Equator, where days and nights keep nearly equal, as the Sun is always so high as to ensure almost perennial Summer.—Very nearly the same Seasonal conditions apply to Egypt, hence the early Egyptians could not approximate so near to accuracy in marking out the Seasons of the Year by the different lengths of the day, as we might do.

Equation of Time.

The reader on looking over the Table will notice in the next column, headed "Equation of Time," the differential times between "*mean*" time as shown by our watches, and "*apparent*" time as shown by the Sun's greatest elevation about noon. These differences, due to the Earth's constantly inclined axis and consequent Seasonal variations of position during its annual elliptic course round the Sun, begin on Christmas Eve, as required ADDITIONS to adjust *Apparent Time*, and gradually increase to over 14 minutes by the 11th Feb., thence decreasing until the times are *equal* about April 15th, from whence they become SUBTRACTIVE adjustments extending to nearly 4 minutes about May 14th, from which time they gradually approach to EQUALITY about June 14th. From this time they again become ADDITIVE until over 6 minutes is reached about July 26th, when they again decrease to EQUALITY about September 1st.—Thence they again become SUBTRACTIVE, increasing until they differ OVER 16 MINUTES about November 2nd, from whence they decrease to equality by December 24th.

THUS THERE IS A GROSS VARIATION, IN $3\frac{1}{4}$ MONTHS, OF $16 + 14 =$ OVER 30 MINUTES' RANGE BETWEEN NOVEMBER 2ND AND FEBRUARY 11TH, IN THE APPARENT TIME, WHEN COMPARED WITH THE "AVERAGE" OR "MEAN" TIME, which is such a wide difference as would be sure to attract the attention of the Egyptian Pyramid Keepers whose specially honorable work was to watch and record these natural gauges of the Sun.—Still in face of the Sun's REGULAR graded declinations such apparently ERRATIC "Equations of Time" would puzzle observers until traced by recurring series over many years. Probably the pyramid observers would verify the resulting variations by sand-rills, with which they could sub-divide the day-times,—just as our predecessors used the sand (hour) glass before clocks were invented.

Four times in the Year clocks agree with the Sun's meridian time, *near* the times of the Equinoxes and Solstices, *but not at those exact*

times, as explained above.—Then only (when the "Equation of Time" is at zero) would the pyramid shadows and watches, or sand-rills, exactly agree; at other times, for which over 5, 10, and even 16 minutes' Equation are shown, the shadows would be considerably deflected, and at mid-day the shortest shadow would sometimes be *before* the meridian line, and at others, *after*, as anyone testing Sun-shadows cast from models, etc., will quickly see.

These variations emphasize the difficulty the Ancients would experience in fixing the points of highest and lowest altitudes of the Sun, whilst the mid-way or Equinoxial points they specially aimed at would, through these differences, give rise to almost endless discussions amongst the Pyramid Priests, whose life-long duty it was to reason out and expound the cause of these phenomena, through which they sought to adjust their Calendar to the Solar Year.

As the angular positions of the Sun, Moon, and Stars are continually changing when viewed, at different times of the Year, from any one standpoint on the Earth—every minute of the variations of the Sun's "Equation of Time" tells—so that it is only practicable to record the shadows cast by the Sun and Moon at certain conveniently fixed intervals.

Such intervals were most readily fixed by lines radiating from the centre of the pyramid base, to gauge (hour and minute) points fixed *equidistant from that great controlling central line* which marked the meridian, pointing due North, along the shadow-floor from the middle of the North base-line of the pyramid.

The Sun's highest elevation each day would cast the pyramid's shortest mid-day shadow, which would fall exactly upon the meridian line when the "Equation of Time" is at zero (0m. 0s.), about *Dec. 24th*, at the *apparent turning point in the Seasons.*

A glance down the figures in this "Equation of Time" column reveals the fact that, whereas all the other columns accord with each other, by alternately increasing and decreasing as the Sun's "declination" raises or lowers the "Elevation" between the Solstices, the "Equation of Time" minutes are varied by other causes, and reach their limit about a month earlier, *except at the Winter Solstice.*

From the fact that the old "Yule-tide," or year's end, *which was used in primeval times throughout Northern Europe, etc., was held on Dec. 24th*, I deduce that those ancient races (Goths, Druids, etc.) traced their Years by the shadows of their high vertical Stones and Conical Mounds, such as Silsbury Hill, in Wiltshire, which is probably the largest ascertained artificial mound in Europe, covering

5 acres and 34 perches; circumference, 2,027 ft.; present top diameter, 120 ft.; sloping height, 316 ft.; perpendicular height, 107 ft.*

Had the Druids simply required a great height, they would decidedly have utilized the adjacent Abury Hill, with its wide top, which could so easily have been raised; but as they required to mark upon the *level ground* the shadow-length of the hill, with its superposed pole, they had no alternative but to pile up an artificial hill above the plain level.

* See Addenda, page xl.

In those Northern Latitudes, the shadows from such high erections were quite long enough for observers to thereby approximate the Year's length. And if (as seems probable) the Silsbury Hill flat top, 120 ft. in diameter, was used to erect a pole thereon to get from its greater height a still longer and more sharply-pointed shadow, it is not unreasonable to conclude that "Yule-tide" could be yearly found accurately within a day's error.—It may even be that the small level platform shown in the final illustration of the "Top-Stones of the Great Pyramid" was so used, with a pole upon it rigged like a flag-staff, either before or after the outer casing-stones were fixed. At any rate, it could so be used very readily to test the merits of my theory, if care be taken to fix vertical a sufficiently long pole over the pyramid's true centre. Then, the Year's progress could be gauged by the "Equation of Time" column, tested merely by the *shortest* mid-day shadow for each day, when the equational "*Additions to Apparent Time*" would be shown by such shorter shadows falling NEAR *the* WEST *side* of the meridian line, and the "Subtractions from Apparent Time" by such daily shortest shadows falling NEAR *the* EAST side of that centre line, upon which the shadow would only exactly fall about April 15th, June 14th, Sept. 1st, and Dec. 24th.

Thus the Egyptians, irrespective of clocks and the outlying hour-shadows, would be able, by the mid-day shadows cast from the pyramid's increased height, to measure very closely the length of the Year by these "Equational variations of Time" falling so near to the inevitably fixed Meridian Line; but people living in higher latitudes would be able to trace the Year by less erections, through the longer shadows there cast, though the Egyptians would hardly be able to get reliable results until after the Great Pyramid was built.

The earliest mankind, almost devoid of clothing, developed most in population near the warm regions of the Tropics where the angular measure of the

"SUN'S DECLINATION" FROM THE EQUATOR

varies North and South of the Equator, as shown by degrees and minutes in the fourth column.

Beginning at Zero (0), when the Sun is vertically over the Equator, about March 20th (as denoted by line **V**), its gradually extending "Declination *North* of the Equator" increases to its maximum of 23° 27′, at line **S** (the Summer Solstice), when the Sun is overhead along the Tropic of Cancer, about June 21st, from which date the "Declination" retrogresses to Zero on the Equator at the Autumnal Equinox, Sept. 23rd, when the Declination begins to be *South* of the Equator, and daily increases to 23° 27′ by the Winter Solstice, Dec. 22nd. Then the turning point is again reached, and consequently, the South Declination begins to decrease until the Sun is again vertical over the Equator at the Vernal Equinox, our old Year starting point (line **V**).

The widest range, thus covered twice on each side of the Equator, is therefore 23° 27′ × 2, which is 46° 54′, the distance between the Tropics, which the nature-searching Egyptians would almost inevitably measure by the mean vertical diameter of the Moon, which is so conspicuous as a measuring line at each half-moon, recurring about every fifteen days. That line, indeed, is the clearest and most marked object in the heavens, because it cuts the visible disc of the Moon into two halves, the one black and the other yellow, and distinctly emphasizes the most telling phases of the Moon, which appear naturally sub-divided by what I will call that "twin-dividing line" which separates the two half-moons twice during each lunation.

When we remember that the Moon is the only sky-object presenting to the eye regular phases which the first men were obliged to adopt as their time-units (for they could not by the Sun know of any other unit but the day), we may see that this vertical diameter was the only first available measure of the Sun's motion.—Probably the Moon was then believed to be of equal size to the Sun, which, owing to the glaring Sunlight, could not be exactly measured.——The Astronomically inclined Egyptian leaders of thought would never then think of measuring the Sun's gradations by disputable "cubits, etc.," when the great discs they worshipped and looked upon as their respective Gods,—Sun (male) and Moon (female)—so plainly indicated the Moon's vertical diameter as their measuring unit for sky curves.

Having come to curve measures noted in *degrees*, it may be well here to record my version as to how the Degree (°) system would be naturally derived.

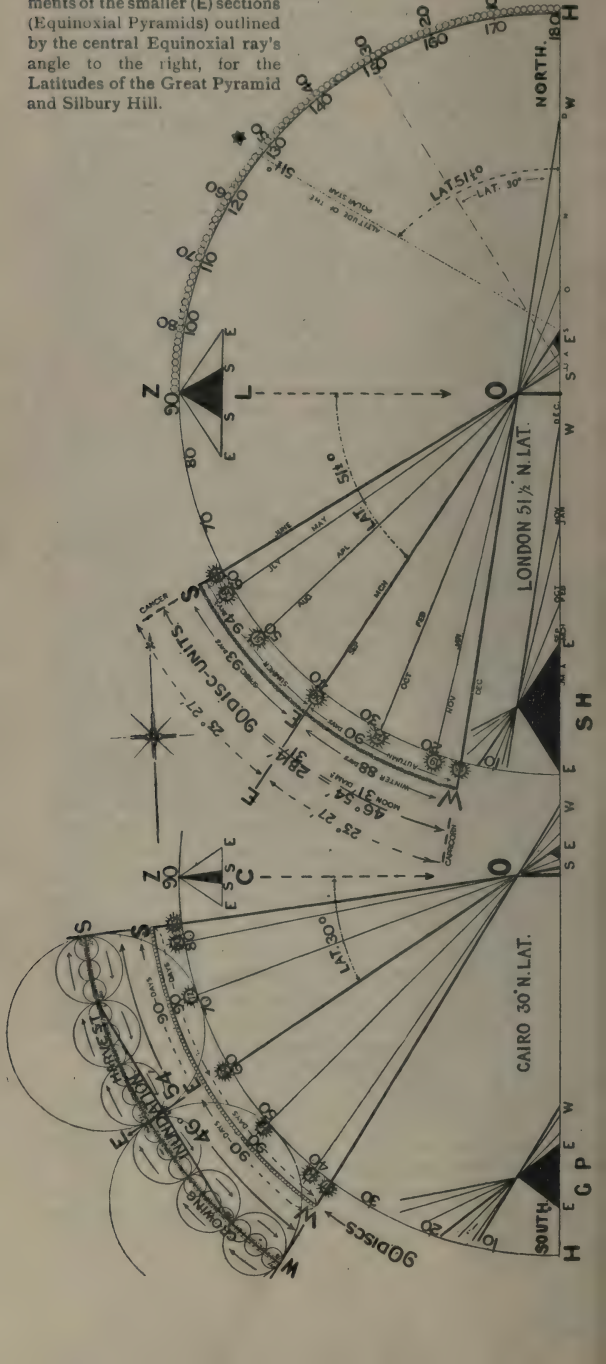
Not knowing of any book which explains its origin, I have reasoned it out from nature's data, as follows:—

Sun Elevations, Plate II.,

Being the *Meridian Section* of the Diagram on Page 16, where the same monthly Elevations are recorded as in the Sun-discs edging the inside fan arcs below, and focussed upon the Obelisk **O**.

As the distance to the Sun is almost infinite when compared with the height of the Obelisk shown, more correct shadow ratios might be shown below the base-line (as will be done with the Silbury Hill diagram at the end of this book), but as the Egyptians looking up from the bases of their Pyramids would naturally view them as above ground, it seems better to thus show this diagram, especially as the protracted shadow-lines range further Northwards, and more distinctly contrast the different lengths of the London and Cairo shadows, which would be more difficult to trace if literally drawn through the circle's centre with the Obelisk (**O**) and shadows below.

GP and **SH** are enlargements of the smaller (E) sections (Equinoxial Pyramids) outlined by the central Equinoxial ray's angle to the right, for the Latitudes of the Great Pyramid and Silbury Hill.



Origin of the Degree (°) Measure for Circular Curves and Angles.

Bearing in mind the overwhelming prominence of the Moon's vertical diameter, which we know measures 31′, a glance at the figures showed that when that 31′ is divided into the 46° 54′ Tropical span (**W.E.S.**), the figurative answer is the 90 discs or links in the chain of gauge-marks from which, I believe, the first idea of measuring sky-curves and angles by "degrees" (°) would be derived, and ultimately lead to the development of the quadrant's convenient 90 sub-divisions. In other words, the 46° 54′ arc of the varying Sun "Elevations" between the Solstice points was measured up the sky-meridian by the Moon's apparent disc, from which arose the ° sign, so figuratively applied by the Egyptians, and from which also we probably get the world-wide application of "measuring all by *degrees*" as diagrammed on the opposite page, which shows Meridian Sections of the Sun's monthly sky-curves, *ex* page 16, as viewed from the East.

Note.—The full 46° 54′ Tropical range, shown within the Curve Section **W.E.S.**, was accurately sub-divided into that most divisible number of 90 parts, which would later furnish the simplest sub-divisions for the complete right-angle or quadrant's 90°—from **H** (horizon) to **Z** (zenith)—*which appears to the eye* as spreading over twice the space of the fan-like **W.E.S.** range of "Elevations."

The meridian arc (**W.E.S.**, which is roughly one-eighth of the circle) between the Solstices was thus first sub-divided into 90 discs, or degrees, which would be found so conveniently divisible that the 90 divisions would readily be applied in *half-disc measures* to the halves of that distance (*approximately, one-sixteenth of the circle*), between the Equinoxes (**E**) and the Solstices (**W** and **S**)—1st, because the half-discs were the nearest appreciable measures of the daily progress of the Sun through each Quarter of the Year, and 2nd, owing to the Egyptians in that way so easily acquiring the habit of sub-dividing into 90ths any required length of arc *not exceeding the Quadrant* (*one-fourth of the circle*)—see **Z** to **H** on the *right*—where the outlying 90 discs are *almost twice* the diameter of the 90 small discs measuring the arc **W.E.S.**

These 90 discs between the Zenith (**Z**) and the Horizon (**H**) denote the *degrees* herein referred to (as numbered *in tens* from 1° to 90°), into which the semi-sky-curve and quadrant are divided.

Each degree of the sky being represented to the eye by the combined widths of the Sun and Moon (Egyptian Twin-Gods), *i.e.*, either Sun or Moon measure about ½°, hence

there are nearly 360 disc measures to the semi-circle, 180 discs to the Quadrant, or 90 double discs between **Z** and **H**.

It would later be noticed that, as the Sun progressed half a diameter daily, the average change of the Sun's daily "Elevation" *was a semi-diameter*, AND THAT THE DAILY CHANGES TOOK ABOUT 90 DAYS to traverse the arc between the Equator and either Tropic DURING EACH of the FOUR NATURAL QUARTERS OF THE YEAR—(1) Winter, (2) Spring, (3) Summer, (4) Autumn, each of which seemed sub-divided into 90-day lengths. But the seemingly incomprehensible differences in the lengths of those Quarters long remained unknown, because it would be naturally assumed that the Sun travelled at an even pace; meantime, it would be quite impossible for the lengths of these Seasons to be known until the Equational (**E**) and Tropical (**W** and **S**) points were accurately fixed, after many centuries of patient research.

Whereas they could discern the 90 discs between **W** and **S**, it would be far more difficult to fix upon the expected 90 half-disc measures on either side of the Equator (**E**) for each Season or Quarter, as their means of observation were too crude.

That difficulty was rendered still more perplexing by the fact (which we know, but they did not) that the Autumn Quarter was 90 days, but the Winter Quarter was only 88 days long. These two Quarters were by far the most traceable, because from any obelisk their shadow range was *double the length of the shadows cast during the Spring and Summer*, therefore they were twice as easily recorded, and much more readily discerned by the Sun's lower elevations being more directly seen.

That would tend to the belief that the Quarters were shorter than 90 days, whereas the time elapsing between the yearly recurring Winter shadows proved they averaged longer.

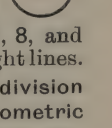
Indeed, these irregularities made their task practically impossible for a time. Yet they were so near the solution that a long time would pass before that impossibility was realised by the geometrically precise Egyptians, who would probably hold to their 90 days or three months' term.

Under no circumstance could they find the Year's length in exact days, because it did not exist; consequently, until they fixed upon the exact time of the Equinox (which was the key to their problem and the vital factor for their pyramid), they could not possibly determine the lengths of the Seasons, as counting the days between uncertain points was almost like counting the pebbles on the seashore by four indispensable separate tests, between which two

Neap and two Spring Tides disturbed the pebble numbers and positions—whilst an accurate answer was imperatively required in whole numbers to permanently record the pebbles rolling upon that particular beach. Such a task might be repeated during ages without reliable results being obtained.

The divisibilty of the Tropical arc was of the first importance in tracing the length of the Seasons. It was so very handy to mark their tenths by the rotation of the prime digits 1o, 2o, 3o, 4o, 5o, 6o, 7o, 8o 9o, with mid-points of 05, 15, 25, 35, 45, 55, 65, 75, 85, —hence, when they noticed that the four Quarters of 90 degrees each totalled to the number **360,** which was the lowest number exactly divisible by 1, 2, 3, 4, 5, 6, 8, 9, 10, and 12 (all the "Table" numbers, except 7 and 11), that would clinch their argument in favour of adopting the 360 degrees' sub-divisions for the circle, which was applied to demonstrate the cycle of their theoretical 360 days' year.

To suit the special local conditions of the Egyptians, with their pyramid ideas, the 360 days' Year was at another time sub-divided into *thirds* (of 120 days), as represented by an equilateral triangle within a circle, such as would be formed on the dial of a clock if the 4, 8, and 12-hour points were connected by straight lines.



It is very remarkable that this division of the Year applies the only true geometric figure obtainable, when shown as a diagram of their **THREE SEASONS** upon the dotted arc **W.** to **S.,** as extended to the left on page 38; for the line drawn across the mid-section from 1 (the Egyptian New Year's Day) to 120 denoted the **Inundation** Season, which bisected at the 60th day (end of 2nd month), marked the **AUTUMNAL EQUINOX.** From that line, a perpendicular drawn from 60 to **E.** also marked the **SPRING EQUINOX,** which, it is most important to note, was thus the central point of pyramid research, as it separated the remaining two Seasons of **Growing** (**W**)—from 121, round the Winter Solstice, to 240—and **Harvest** (**S**)—from 241, round the Summer Solstice, to the 360th day (as shown by the arrows).

This graphic sub-division of the **Inundation** Season very typically indicates the rising and falling Nile by the meridian arcs rising above the straight line from 1 to its greatest height at 60, and then falling to its normal height about the 121st day, when the **Growing** Season began.

The circle might very conveniently have been first divided into 12 parts, like the clock, as the system of *thirds* would have sub-divided the estimated "Quarters" or "90-day transits between the Equator and the Tropics" into

their three 30-days' months, which would then appear in the same 12-monthly order upon the Year circle as the 12-hour points of the clock.

From such reasoning the 12 dial-marks upon the clock were probably derived, because all the twelve months were undoubtedly each sub-divided into *thirds* (the first recorded weeks) of 10 days each, *i.e.*, 36 weeks of 10 days each, which, diagrammed as a Year circle upon the clock dial, would show the hours as months divided into *thirds* (36 weeks), which, sub-divided into their 10 days, would completely record the 360 days' Year, as each day on the **12-Hour circle** would be represented **by 2 minutes,** or on the **Hour circle** by **10 seconds,** *i.e.*, $\frac{1}{30}$th of the month or 5 minute-spaces.

This division, of not only the Year, but also the Months, etc., **into thirds** must have had some definite cause, which, I suggest, **is to be found in the ratio of the diameter to the circumference of a circle,** as roughly outlined on the top Cairo arc **W** to **S,** which is sub-divided into 18 weekly circles of 10 days each. These, traversed twice each Year, completed the 360 days, and are so arranged to convey the idea that these small weekly cycles, shown in **threes,** not only turn into each other, but their three united diameters also display the length of the **circumference of each weekly circle,** as well as the **diameter of the Monthly circle.** The Monthly circles, etc., also, in their turn, are continuous in that geometric view in which the Egyptian disc-worshippers delighted.

All these circles have their **diameters** measured upon the arc **W** to **S,** which is thus sub-divided, and as it was the custom then, as now, to describe the sizes of circles according to the lengths of their diameters, that would appear the natural way of marking that arc.

It is quite possible that the pyramid priests, in their close observations of the Moon, might have reasoned out *as parts of a circle* the passing of that mystic curved edge of shadow as it develops during the Moon's phases, and that the circles I have worked out would, in their view, progress along the meridian arc in something like lunar sections. That would strengthen the natural idea that all periods of time cycled into each other, as was demonstrated by the recurrence of the Seasons, which, at one time, were regarded as the *thirds* of the Year. The consideration of *thirds*, etc., in practice, outweighed the advantages of measuring the arcs by splitting the one-fourths into one-eighths, one-sixteenths, etc., as the positions were not so naturally indicated to the mind as by the TENS' digits of 90° measure.

The four 90-day Seasons between the Cairo arc's dividing points **W.E.S.** indicate, by the dotted lines and arrows, the annual course of the Sun's mid-day points in its apparent cycle, which, though diagrammed sideways, would naturally suggest a circular motion, as if the Sun was spinning lower at **W** and higher at **S,** —just as a slinger's stone, swung round in a plane of, say, 45° from his upright position, would, in passing its highest curves, cycle higher as a lengthening of the string gradually increased the radius of the circle. That, at least, was my idea of the Sun's motion as thought out without the aid of book-knowledge or teaching, whilst I was a boy "crow-tenting" in the harvest field, with sling in hand.

Such, then, is to my mind the natural view of the phenomena most likely to have been taken by the early Egyptian observers. It seems probable that they would necessarily diagram the cycling Year as a circle, thinking its Quarters should, in theory, be equal, *i.e.*, 90 days of an assumed 360-day Year, **which, in diagram-form, gives the 360° circular measure, as handed down to us.**

The Quarters are really unequal, being 88, 93, 94, and 90 day, as shown within the London Elevations arc **W.E.S.**

They had not then discerned the laws governing the true Year, nor the other subtle natural laws which modify planetary motions.

The ruling characteristic of all the seeming motions of the Sun, Moon, and Stars is, that they are *almost entirely* GOVERNED BY SOME SIMPLE LAW, *but not quite.* These necessitate adjustments for parallax, refraction, etc. *E.g.*, the apparent circular orbit, etc., is modified to an elliptic course by the attraction of the Sun and other forces.—These again, as viewed from the Earth, are complicated by the axis of the Earth being not quite vertical, but inclined at over 23°.

From these and other causes arise the following inequalities between the Natural Quarters of the Year:—

1. Winter Solstice (Dec. 22) to Vernal Equinox ... 88 days
2. Spring Equinox (March 20) to Summer Solstice... 93 „
3. Summer Solstice (June 21) to Autumnal Equinox, 94 „
4. Autumnal Equinox (Sep. 23) to Winter Solstice ... 90 „

= Year of 365 days

The average of these Quarters is 91¼ days, but the inflexible methods of Egyptian thought, coupled with the effective (though then unknown) fact that the Quarters range from 88 days, and so appeared uncertain, would uphold the convenient 90 days (3 months of 30 days) as the Quarter (or Quadrant), which, extended as the circle of the 360 days' Year, would complete the 360° protractor of circular and angular measurement, now universally applied in "degrees."

The varying Sun "Declinations" accentuate the gradations of the lengthening shadows, which differ more the further we leave the Tropics for regions diverging North and South. They would be far more difficult to trace in Egypt than in London, where the Equinoxial mid-day shadows are about twice as long as at the Summer Solstice, and the Winter Solstice shadows about four times as long.

To get a more effective idea of this difference, we will consider the

SUN'S APPARENT NOON ELEVATIONS,

detailed in the two columns, headed respectively, "Cairo 30° N." and "London 51° 29′ N.," which compare to the *nearest* degree, the heights of the Sun for the 73 dates given. Those *for the 21st of each month* are better shown in diagram-form on page 16, where the curved lines, as viewed from the North, denote the "Monthly Elevations" (or course of the Sun from Sunrise to Sunset), crowned by their noon Sun-discs, within which are recorded the degrees of noon elevation, which are lowest at the Winter Solstice, when London shows 15° against Cairo 37°. During Jan., Feb., March, April, May, and June, they rise successively to their *greatest* heights of London 62° and Cairo 83° at the Summer Solstice. From thence, during July, Aug., Sept., Oct., Nov., and Dec., the Sun's semi-circular path across the sky is daily lowered back to the Winter Solstice.

The highest point of each arch marks the apparent or meridian noon at each month (or moon) period, which was distinctly the best time to fix upon, and was necessarily taken by the Ancients.

The six spaces between the monthly Sun's arched courses accord with the six steps found in the Sakkarah Pyramid, etc., whilst the dotted true semi-circles (representing the 45° or midway imaginary curve between the South Horizon and the Zenith) serve to contrast the *two* Cairo elevations which are below 45° with the *four* London elevations within that limit, and show that at Cairo the Sun is always 21½° higher than London, because the latter is 21½° higher Latitude (*i.e.*, 51½ − 30 = 21½).

CAIRO ELEVATIONS.

At the Equinoxes, when day and night are equal over all the world, the Sun being vertical over the Equator, there registers the full zenith elevation of 90°; but if observed on the same meridian *at the same time* from 30° N. Lat. at Cairo, the apparent elevation is but 90° — 30° = 60°, as per page 32, at line **V,** below which the Cairo, etc., elevations in the Northern hemisphere increase *exactly in accordance with the growing Northern "Declination"* (shown in the previous column), until at the Summer Solstice the full 23° 27′ is added, making Cairo's maximum Sun elevation 83° 27′. Thence the heights are reduced as the *Northern* "Declination" diminishes to zero at the Autumnal Equinoxes,

beyond which, as the declination extends *South of the Equator*, the elevations still further decrease, until at the Winter Solstice the Cairo mid-day Sun reaches its lowest point of 37°.——From that turning point, the elevations rise until the next Summer Solstice, and as the heights gradually increase the days grow longer and the Sun-shadows shorter, as per the last three columns.

These constantly changing Elevations, lengths of days, and reach of shadows, recur yearly all the world over, according to the Latitude from which they are viewed, as may be readily seen by comparing the degrees of the Cairo "Elevations" with those in the next column for London, where the uniform shortage throughout is the 21° 29′, which separates London's 51° 29′ Latitude from Cairo's 30°.—At any place 60° N. Lat. the Sun-elevations will therefore always be 30° lower than at Cairo. Viewed from the Equator, the central line **E** (page 38) of the fan-like rays would be vertical at the Equinoxes, from which the Elevations vary to 90°—23° 27′ = 66° 33′ **North** in **SUMMER**, and likewise to 66° 33′ **South** in **WINTER**. At 30° **South** Lat. the same heights of Elevation would be registered as at Cairo, but they would appear on the **Northern** curve; and so on, all the world over, this fan-like-range of "Elevations" always appears to cover the same length of the meridian-sky-curve, but the position of that arc on the meridian varies with the Latitude.

Latitude and Longitude.

For some readers, an explanation of Latitude here seems advisable. The Latitude of a place is found, either by measuring in degrees along its meridian the angular distance of its *Zenith* (**Z**) from its observed *Equinoxial Point* (**E,** in the centre of the *Moveable Tropical Arc* **W.E.S.**) at mid-day,—or by noting at mid-night the Equinoxial *Altitude* (height) of the **POLAR STAR** from the *Polar Horizon* (**H**) of such place, when that counterpart of the meridian is measured in like degrees. In both cases, allowance must be made for the known "Declination of the Sun from the Equator" for the particular date used, *unless that is the "Equinoxial Day,"* when alone those simple observations are naturally adjusted. *E.g.*, by the diagram on page 38, we see the *Latitude* curves denoted by "dot and dash" lines from the Equinoxial double lines (**E**) to the *vertical "hit and miss" lines* **C O** and **L O,** whilst the corresponding method of finding London's Latitude by the Polar Star is shown to the right, where the altitude of the Polar Star is of course at right angles to the Equinoxial line from our supposed standpoint at the foot of the small pyramid $\mathbf{E}^{S}$.

But, as on the 21st of February or October, the Sun's "Declination" of, say, 11 degrees South, has decreased its "Elevation" 11 degrees from the 39° at the Equinoxes, the Latitude curve from direct Sun observation then would give 90° – 28° (the observed "Elevation") = 62°, *from which the* 11 *degrees "South Declination" for that period must be deducted to adjust the Equinoxial Latitude of* 51°.

"Ex-meridian" observations can be used to find the LATITUDE when the observed Sun, Moon, or Stars are *not upon* the meridian, *provided the altitudes are corrected to the meridian by spherical trigonometry or trigonometrical adjustment tables;* but, as it is fairly evident that *neither of these means of adjustment were available for the early Egyptians to use* (because they were admittedly defective in working out such intricate calculations), we may safely conclude that they depended upon the more reliable meridian observations first mentioned, as evidenced in the Equinoxial slope and meridian pointing shape of the pyramids.

This seems to have been prevalent throughout Oriental countries, where the significant name "Oriental" seems derived from the great care with which the Ancients "*orientated*" their temples, public buildings, etc., to the mid-day Sun point, as marking their *noon* each day upon the meridian.

As the *noon* thus observed was noticed to *appear earlier* in countries *to the East* and *later to the West*, this difference of time, known to us as LONGITUDE, subsequently became likewise naturally noted in degrees of 90 per quadrant.

This system of LATITUDE and LONGITUDE was almost as inevitable to be developed by men seeking out the laws of nature as were the laws of gravitation, etc., for not only do the Sun and Moon daily arch nearly semi-circular courses through the sky, but the whole range of the sky from every place appears to the eye as a celestial dome, completely arched by *quadrants* from every point of the *Horizon* to the central *Zenith* overhead.

Far beyond these was the most impressive fact that the very Earth upon which the observer stood was traceable all around by a distinct circle (horizon) bounding his vision. This circle could never be approached nor tangibly defined, but seemed to move with the traveller, as also did the sky-dome which it appeared to bound. Thus, although all these forced the consideration of the circle and its parts upon observers, there was nothing in the sky or horizon to mark out such equitable sections or divisions as were absolutely essential for purposes of travel and intelligent discussion between observers of these most interesting phenomena, all of which appeared to be in quarter, half, or whole circles.

Hence, the four arbitrary compass points had to be fixed upon for convenience. First would rank the EAST, as marked by the rising Sun, so strikingly shown in that oldest great monument of antiquity, the Sphinx. The WEST, as the point of Sunset, would naturally follow, whilst midway between those points the SOUTH would be noted from the Sun's highest daily elevation marked down towards the horizon, opposite which would finally be noted the NORTH point, in the opposite direction.—The division of these four Quadrants of the horizon between the points named would easily follow into *thirds*, sub-thirds, and tenths (degrees), making the 90° for each Quarter, which have proved so convenient, though of course the sub-divisions might have been different, just as French savants have divided the circle into $\frac{1}{100}$ths.

That idea probably led to the measurement of the Earth by degrees of Latitude and Longitude, thus naturally derived from observations of the Sun's disc, to which the supernatural Egyptians attributed their highest conception of Divine Power and Knowledge.

As the Latitude of a place always remains fixed, the varying Seasonal "Elevations" may be graded in degrees along what we may term "*the tropical or moveable* 46° 54′ *of the meridian arc* (**W.E.S.**), between the Summer and Winter Solstice points, as shown upon page 38, which illustrates the *mid-section* of the curve Elevations, *ex* page 16.

The degrees of "Elevation," etc., were best traced by shadows, as may be seen by reverting to the diagrams, shown in true angular scale upon page 38, as viewing the meridian semi-circle from the East. There the straight lines from the monthly Sun-discs represent the Northern edges of the mid-day-shadows cast over the short Obelisk denoted by the thick upright column under **O** in the centre of each arch.

The direct lines from the Cairo high "Elevations" all fall within the short space between **S.** and **W.** (typed under the base-line), to the right at the Obelisk's Northern foot, whereas the London lower "Elevations" cast much longer shadows to the right from **S.** to **W.**—These are more clearly outlined by the rough plan of London and Cairo Obelisk mid-day-shadows, as detailed on the top of page 16, from the shadow-lines cast over the same vertical Obelisk O between ***C*** and ***o*** to the left and ***L*** and ***n*** to the right. From these it will be seen that the London shadows (foreshortened to about half their comparative length, to get within the page) are still *about twice the length of the Cairo ones.*

From these, we can see how much better shadow-readings from erections of the same height could be obtained in higher latitudes, or, inversely, that to get the same range of differential shadows the Cairo erection would need to be about twice the height of the London (or Silsbury) one.

Sun-Shadow lengths at London.

This difference in the lengths of the shadows is far more marked than the mere "elevation" figures would seem to indicate, as, taking the London shadows detailed for example on page 32, the Winter Solstice elevation of 15° is increased *about four multiples* of that height to 62° at the Summer Solstice, whereas between the same points the noon shadows are thus inversely decreased from 4·01 to ·56, or *nearly eight multiples* of the latter. The 9-0 a.m. and 3-0 p.m. shadows range between 1· and 12·64, or *nearly thirteen multiples*, whilst the 6-0 a.m. and 6-0 p.m. shadows, having increased *by about six multiples*, from 3·12 lengths at the Summer Solstice to over 18·17 before the Equinoxes, so rapidly extend during the Winter months that they were, in the 1712 Almanac, declared to be quite "too long to record." Even the 8-0 a.m. and 4-0 p.m. shadows on Jan. 11th are shown to be 92·84 times the length of the *staff* on the 1712 "Travellers' Sun-dial" reproduced facing page 1, though no *staff* could shadow so far.

As these last three columns of page 32 are reproduced more to prove that shadows were used at such recent dates to trace the "Time of day, etc.," than to show their exact lengths, I have not extended them as might be done, therefore no responsibility for their accuracy attaches to me.

This rough explanation concludes the "Natural Gauges for the Sun" and Sun Elevation Diagrams on pages 16, 32, and 38, and will prepare the reader to follow my "Shadow-grams" of Sun-Shadows A, B, and C, which were necessarily taken where I live at York, as neither time nor means would allow of my taking them near Cairo,—where they could have been got most perfect.

In order that the cause of the differences in size and outline of these "shadow-grams" may be better understood, some explanation of the pyramid and cone models from which they were obtained seems advisable.

Pyramids *v.* Cones.

The fact that cones of great height have been used in Peru, Abyssinia, India, etc., in pre-historic times seems, from a study of their shadows, to strongly support my theory that all these high vertical erections were built to trace the course of the Seasons and the Year.

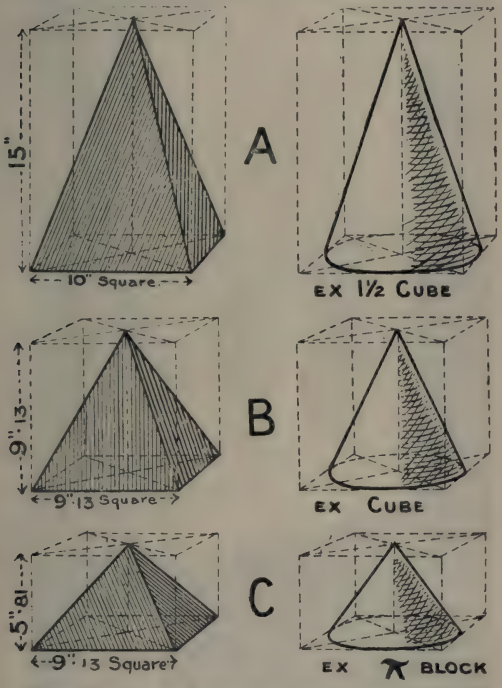
But it is obvious that whilst, height for height, the tips of the pyramid and cone would both concurrently point their shadows to the same distance from the centres of their respective bases, those cast from the cone would always shape isosceles triangles, which are not nearly so instructive as the beautifully perfect gradations of every conceivable form of triangulation shown by the pyramid shadows, some of which were traced direct from the Sun's rays upon my first rough diagrams, designed to differentiate the merits of shadows cast from high and low pyramids of various slopes.

The study of these led me to think that the designers or builders in choosing suitable

POSITIONS TOWARDS PERFECTING THE SUN-SEARCHING PYRAMID

for tracing the Sun's course, would be guided by the increasing tendency of the Sun-shadows to cast their Northern-sides in a continuous straight line the nearer the pyramid approached the true 30° N. Lat. position—provided its slope was directed to the Equinoxial meridian point when viewed from the North.

To test this idea, *and determine what was the best possible shape of pyramid*, models of pyramids and cones were made graded to the sizes A B C, to thereby prove the shadow effect of these fixed standard heights and slopes, as illustrated in the dark blocks below, where the dotted outline shows the full size of the blocks out of which the models were cut:—



THE PYRAMID A is the greatest obtainable from a cube-and-a-half whose base is ten inches square and height fifteen inches.

THE PYRAMID B is the largest obtainable from a cube whose side is $\frac{1}{1000}$th of the Great Pyramid's base.

THE PYRAMID C is an exact model of the Great Pyramid, on the scale of $\frac{1}{1000}$th of its dimensions, as cut from a π block.

THE CONES are the same height and diameter of base as the pyramid with which they are respectively paired for comparison.

All the above, with others of smaller size representing obelisks and trilithons or cromlechs, were placed on the duly orientated and levelled diagram papers before sunrise, and

outlines of their shadows duly ruled off at each half-hour up to sunset, whilst the hours of the day were marked below the tips of their respective hourly shadows. The photo-block below shows the models *in situ*, casting their 6-30 p.m. shadows upon the diagram paper.

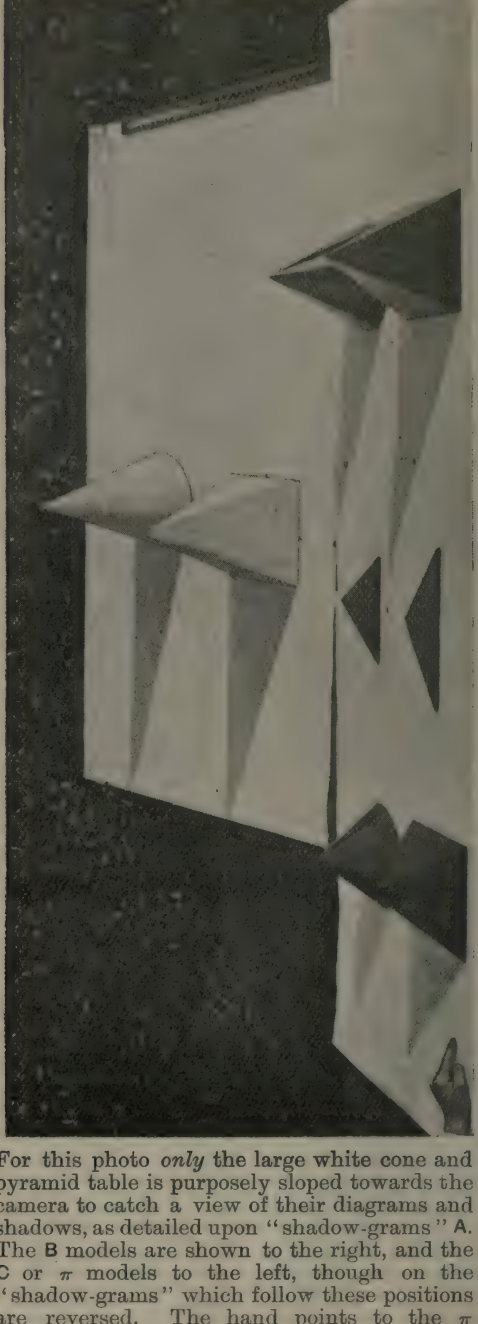


PHOTO-BLOCK of PYRAMID and CONE MODELS from which the "SHADOW-GRAMS" were made by M.B.C.

For this photo *only* the large white cone and pyramid table is purposely sloped towards the camera to catch a view of their diagrams and shadows, as detailed upon "shadow-grams" A. The B models are shown to the right, and the C or π models to the left, though on the "shadow-grams" which follow these positions are reversed. The hand points to the π pyramid, meridian and diagonal sections of which are shown between the B and C models.

Sun-Shadow Diagrams A, B, and C.

The models were fully exposed to the Sun, so that their shadows could be easily traced. Care was taken to orientate to the testing positions by the compass, and to keep the tables perfectly level.

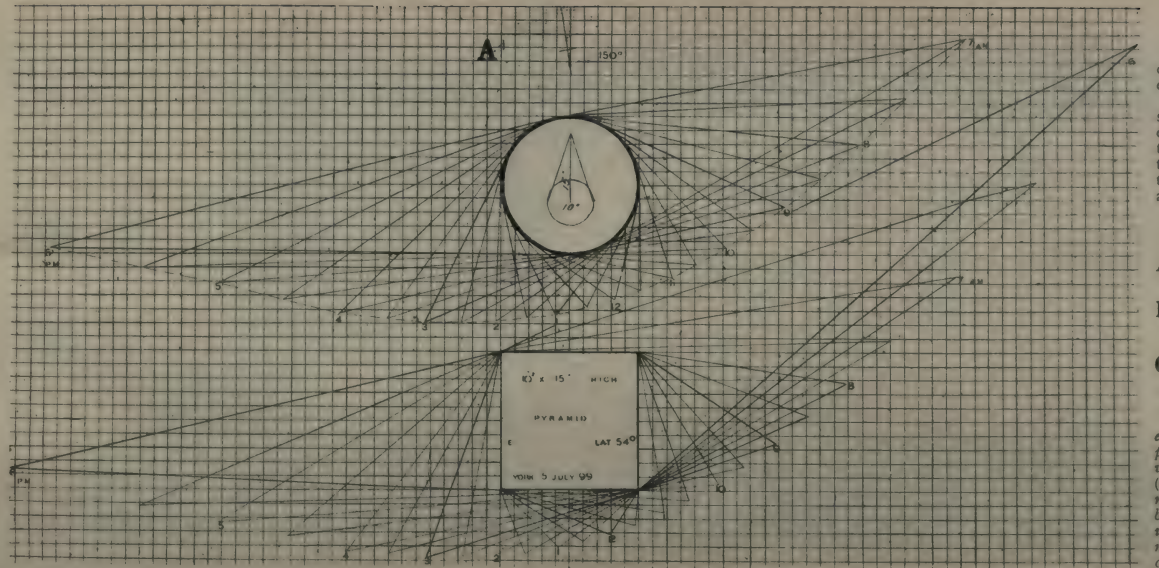
The Sun, rising in the East, casts the shadow to the West of any erection, and as the source of Light appears to be constantly advancing Westward, the shadow follows round the opposite half of the elliptic area like a compass needle or clock pointer, directed from the Sun, advancing Eastward along the Northern side of the object (where the shadow-tip is due North at Meridian Noon in the Northern Hemisphere) until the evening shadows are thrown to the East, as the Sun sinks in the Western horizon. The shadow is thus constantly moving, and gradually passes all points from West to East. It can therefore only be recorded at certain fixed intervals, which, for convenience, I have shown at each half-hour of the clock, from 6-0 a.m. (right) to 6-0 p.m. (left), as the quarter-hour shadow-grams are too close for observation upon our small scale, and not sufficiently clear. Over any given point in the outer circuit of the shadow range the passage of the shadow tips from any high object is much more rapid than inexperienced persons would suspect; indeed, considerable dexterity is required to secure the true marking of the shadow outlines upon the ground or diagram.—Fortunately, business hours enabled me to rule off the vital mid-day shadows, and those most rapidly moving ones before 9-0 a.m. and after 5-0 p.m., whilst an assistant filled in the intervening lines.

Knowing that the Pyramids, Obelisks, Sun-stones, Temples, etc., were so carefully *orientated* to the N., S., E., and W., my experiments were directed towards tracing the value of true, and the defects of false, orientation, by twisting my models and diagram papers to the 150°, 160°, and 170° pointings of the compass during the time a series of daily Sun-shadows were being taken.—These proved the great importance of orientation to get the shadows true, and fix upon meridian noon.

To contrast the effects of differences due to defective orientation and the variations arising from factors comprehended in the term "Equation of Time," *i.e.*, between apparent (meridian) and mean (clock) noon, three sets of these diagrams are shown for the dates given, when clocks were *about* 4 *minutes before meridian time:*—

July 5th, Series 1, orientated West of true North.
July 7th, „ 2, „ 10° nearer North.
June 30th, „ 3, „ slightly East of true North.

The "shadow-grams" for intervening dates were mostly incomplete, because in our fickle climate clouds obscured the Sun at odd $\frac{1}{2}$*-hrs.*



Shadow-grams A¹, B¹, and C¹

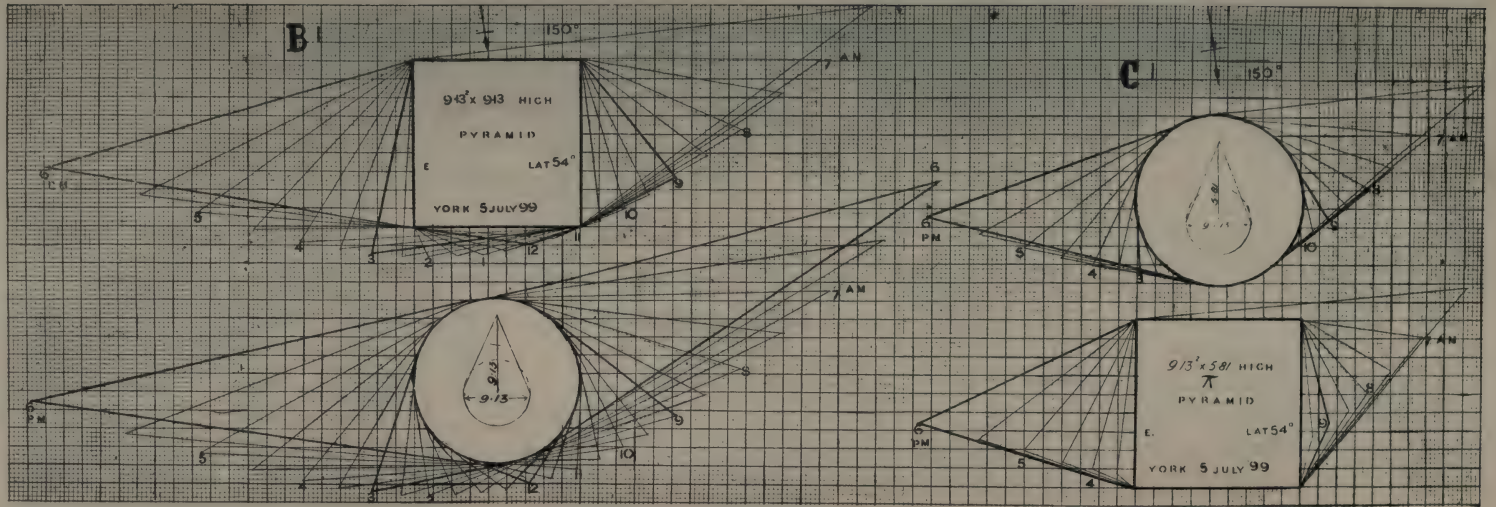
The larger diagram squares represent sq. ins. The Cone and Pyramid Models B¹ (on this opening only) are transposed, to facilitate the comparison of Cone and Pyramid shadow-grams.

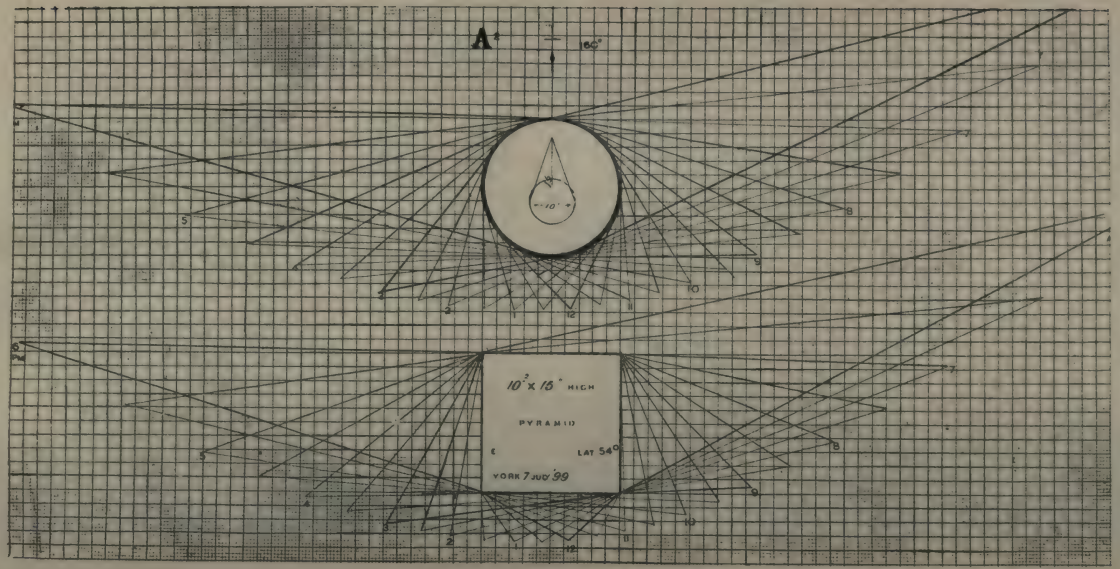
The heights of the models by which these shadow-grams were taken direct from the Sun determine the lengths of the shadows, whilst the relative ratio lengths of those heights to the models' base-lengths determine their proportionate breadths of shadow for both the Cones and Pyramids, thus:—

	Height in Inches.	Base-line in Inches.	Relative Description of Shadow-grams.
A ...	15·00 ...	10·00	Longest and narrowest—wide jagged lower edges.
B ...	9·13 ...	9·13	Long, but broader—narrower jagged lower edges.
C ...	5·81 ...	9·13	Shortest and broadest—*North lower edges approximate to one continuous straight line edge of shadows.*

(Model of Great Pyramid.)

Our South view of them, as looking to the Sun, *emphasizes the necessity of true orientation, and proves that it was almost impossible, before clocks were invented, to fix the midway point or meridian-(12)-noon shadow without truly orientated Pyramids, directly over the apex of which the Sun could be "sighted" at noon from the North meridian line, upon which the noon shadow should fall—When noon was wrongly shown, all like recorded times of the day would be wrong and misleading.*


B
150°
9.13' x 9.13 HIGH
PYRAMID
E
LAT 54°
YORK 5 JULY 99
7 AM
6 PM
9.13
9.13
C
150°
9.13' x 5.81 HIGH
PYRAMID
E.
LAT 54°
YORK 5 JULY 99
7 AM
6 PM



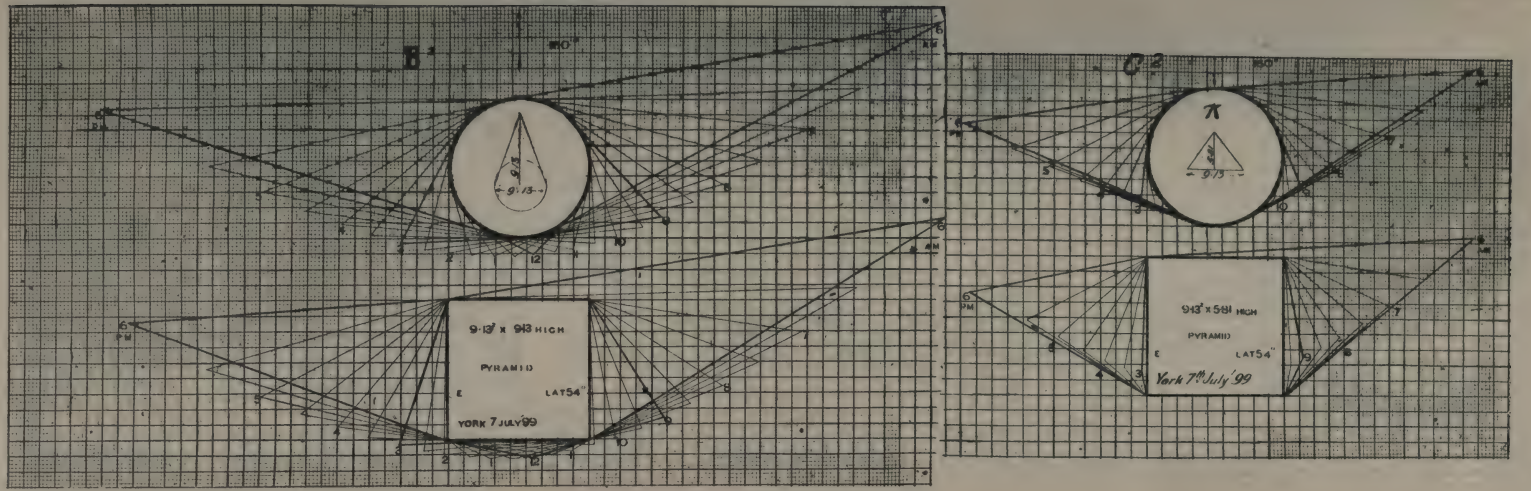
Shadow-grams A^2, B^2, C^2.

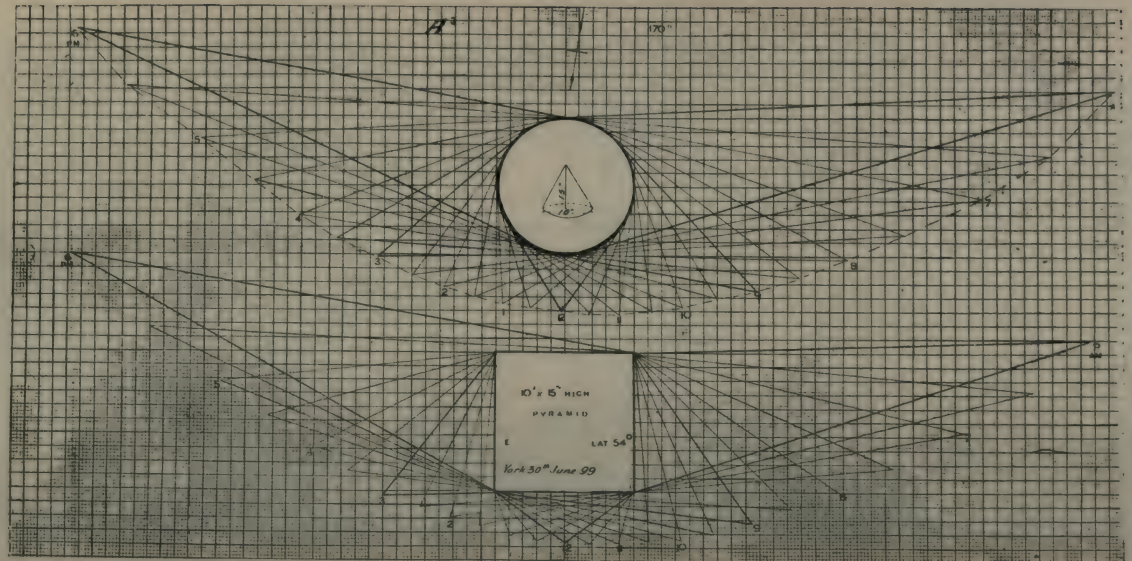
Defective Orientation.

The twisting of the models and diagram paper from the needle's North direction (as shown by the top compass pointer between A and 150° on the previous opening and 170° on the next) deflects the shadow-grams in a slanting direction, first from North-West to the third or North-East direction.

Along with this deflection from the π models (**C**), which are the real objects herein considered, we may notice that the *Cone diagrams protrude the Northern edge and apex of their triangular half-hourly shadows slightly* OUTSIDE the larger 6-o a.m. and 6-o p.m. lines, because the slope of the Cone uniformly accords with the 52° North-mid-slope of the Pyramid, *whereas the Pyramid shadows are deflected a corresponding distance* INSIDE the like 6-o a.m. and 6-o p.m. lines, by the 42° angle of the "arris-ridges" diagonally uniting the Pyramid sides.

Further, the effect of the three degrees of orientation, or twisting, is best marked by the π Pyramid, which thus gradually in C1, C2, C3, *closes up* the North interstices between the pinions of the morning (right) shadow-wing-series and correspondingly *opens* the evening (left) series. This second series best shows the quarter-inch-square lines of the diagram paper for measuring shadow areas without trigonometry.


9·13' x 9·13 HIGH
PYRAMID
E LAT 54°
YORK 7 JULY 99
9·13' x 5·81 HIGH
PYRAMID
E LAT 54°
York 7th July '99



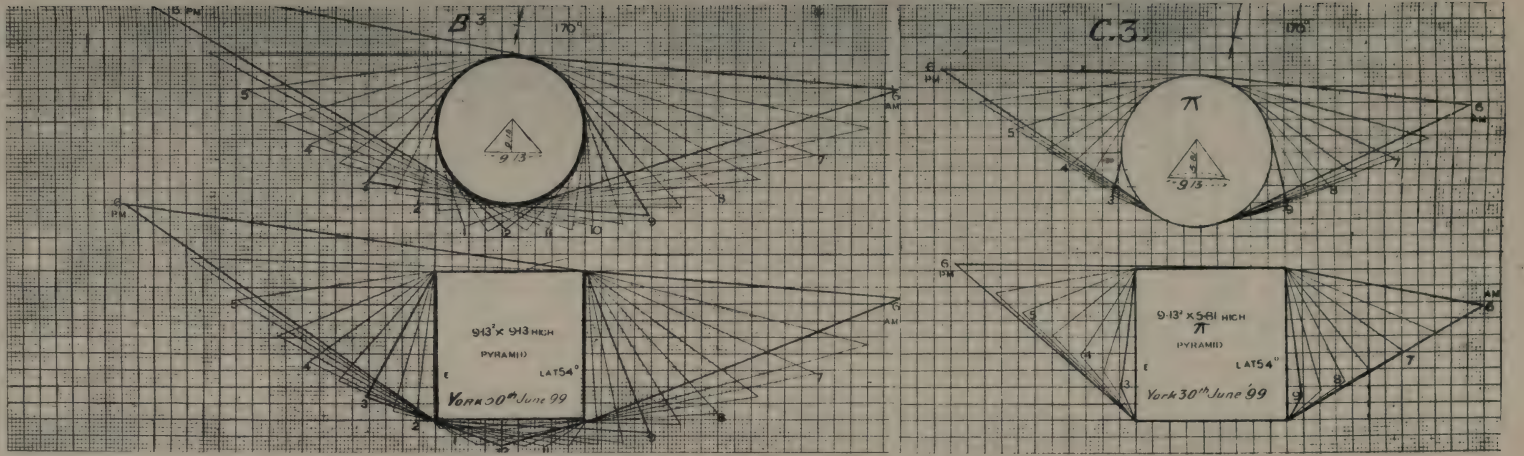
Shadow-grams A3. B3, C3.

The most emphatic characteristic of these shadow-grams is the *wing-like appearance of the morning (right) and afternoon (left) triangular outlines of the half-hourly shadows*—numbered alternately for each hour—which collectively diagram the "*time-of-day*," and demonstrate the original idea that "*time flies*."—They are shown at three varying orientations to prove how extremely difficult it was to mark true Solar time unless the Pyramid was rightly orientated to ensure the morning and afternoon hourly shadows falling evenly on their respective sides of the meridian-line

Clock time was 4 minutes before *meridian noon*, which would therefore fall more to the East (left). Position A^1 throws clock noon 3 squares to the right of the central line, whilst A^2 is 1¼ to the right, and A^3 on the left of the line.

Only shadow-grams near the York Summer Solstice Elevation of 59½° are shown, as a rough equivalent test of Cairo's 60° at the Equinoxes. Those for other Seasons at York range beyond the largest (80 in. by 40 in.) diagram-paper obtainable for working fair-sized models in groups thereon.

The shadows from the models A. B, and C establish the peculiar advantages of the latter for testing the crucial 60° Equinoxial and other Seasonal Elevations of the Sun by the Great Pyramid, whose corner "arris-ridges" would deflect the easily recorded straighter connecting North edge of the shadow-wings slightly *Southwards* during the Summer six months and more *Northwards* during the Winter, as roughly indicated by *PLATE III.*, page 60.


B 3
70°
6 PM
6 AM
9·13
9·13' x 9·13 HIGH
PYRAMID
LAT 54°
York 30th June 99
C.3.
π
9·13' x 5·81 HIGH
PYRAMID
LAT 54°
York 30th June 99

Daily "Shadow-grams."

It is quite impossible within the small limits of this booklet to fully explain the significance of the variations displayed upon the "shadow-grams" which appear upon the foregoing pages. They can be fairly understood by inspection in the light of the brief description given.

The A pages were photographed down to about $\frac{1}{3}$th and the B and C pages to about $\frac{1}{10}$th the original size to come within their pages.

These testing Daily Shadow-grams might have been diagrammed by mathematical means, but as the accuracy and merits of the method employed would have led incompletely informed opponents to stir up a contentious debate as to the allowances made for refraction, parallax, etc., which lack of spare time would not allow of my following up, I decided to take the shadow-lines direct from the Sun, to avoid all possible dispute as to their accuracy, and at the same time enable me to trace the progress of the Equinoxial-pyramid-shadows as they would be viewed by the Egyptians.

Knowing Cairo's Latitude was 30°, which, deducted from the 90° between the Equator and the Pole, gave 60° as the Equinoxial Elevation at Cairo; in the same way, I took from the 90°, York's Latitude of 54°, leaving 36° as my local Equinoxial Elevation, but seeing that I required to test the shadows upon Cairo's Equinoxial conditions, when the Sun was 60° high, it was necessary to wait until that was approximately reached by York's maximum of 59½° Elevation at Mid-Summer.

The effect of the different Pyramid Shapes in deflecting the "*in-cutting*" and "*out-cutting*" North-shadow edges was duly noted, and decisively demonstrated the great advantage of the Great Pyramid's π shape C in casting straight united lines along the Northern edge of the shadow-grams, whilst the B models, with height the same as the base length, cast a jagged, "out-cutting" series of shadows, and the A models, which were half as high again as their bases, cast a relatively still more jagged shadow series.

These proved that the experienced Egyptians had for their great purpose chosen the best shape, which gave the simplest and easiest style of shadow-grams for permanent and comparative record, and explains the reason why they adopted that characteristic π shape.

The shadow-grams are given as viewed from the North-side, looking towards the Sun in the South. But if we view them from the South-side, or, as the pyramid-keepers would obviously do, from the Great Pyramid's elevated North Entrance, looking over the North-shadow-floor, we cannot fail to notice that the hourly shadows are numbered in the same rotation as upon the face of the Sun-dial and clock, which were most probably invented through such shadow observations, which previously had furnished all daily *Time* until then improved upon.

It will be noticed that the wing-like diagrams are nearly level in position 3, and that the two deviations from the true North in positions 1 and 3 deflect the shadow-tips in the form of elliptic curves (as shown by the half-connecting tip-lines of the "A" cone-shadows), which would cross each other near the meridian or true North and South centre line, as shown by 12 in position 3.

Beyond those deflections due to defective orientation, there are slight twists hardly discernible in these small diagrams (though observable upon the Great Pyramid's huge shadow-grams), due to the Seasonal angle of the Earth's axis to the Sun's rays, resulting in what is called the "Equation of Time," etc., which accounts for the difference between the time shown by the Pyramid's noon shadow and the true mean noon of the clock, as explained under that descriptional heading of the "Natural Gauges for the Sun."

The test positions were purposely differentiated by 10°, as otherwise the shadow variations could not be seen on the small scale to which the size of this book confines us; but the usual Seasonal differences would be distinctly traceable on the large scale of the Great Pyramid's direct shadows, and as such were sure to engage the pyramid-keepers' earnest study. Indeed, the elucidation of these Seasonal deflections, though subject to slight puzzling variations in different Years, would enable the priests to approximately determine the Seasons and length of the Year, and thus achieve their greatest object.

The 1st (150°) diagrams show the noon shadows, not mid-way, but to the **right,** whilst the mid-way shadows would record a false elevation and noon about 50 minutes **late.**— **In fact, the whole basis of such daily time would be wrong**. The 2nd (160°) diagrams again, show 12 noon to the **right** and the mid-shadow about 20 minutes **late,** whilst on the 3rd (170°) diagrams 12 noon falls to the **left,** and appears after the mid-way shadow which is about 10 minutes **early,** because the whole apparatus was twisted to the left.

All the three series were subject to correction, for the 16° 33′ West variation of the magnetic needle from the true North point which prevailed during the time these shadow-grams were being taken near the Summer Solstice of 1899, for which the London Elevation (E. 62°) is shown as the factor tabulated on page 32, which should be reduced by $2\frac{1}{2}°$ for the increased Latitude at York ($54 - 51\frac{1}{2} = 2\frac{1}{2}$), making the true elevation about $59\frac{1}{2}°$.

Unavoidable exigencies of business confined me to York, where the Sun's greatest elevation is only about $59\frac{1}{2}°$, hence I could not secure the desired 60° to exactly accord with the huge perfect Equinoxial Shadow-grams of the Great Pyramid from which they ought to have been taken.

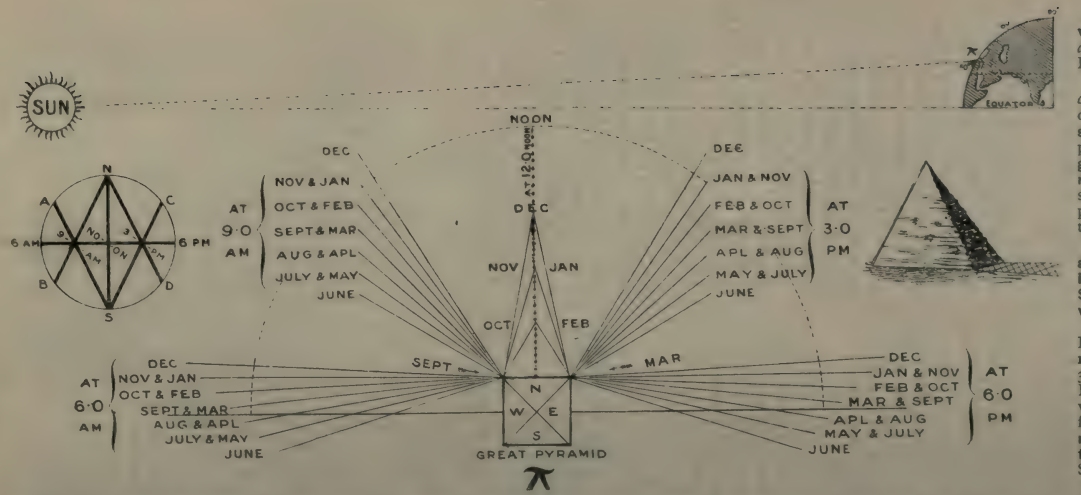


Plate III.—ROUGH DIAGRAM of the NORTH-EDGES of assumed and purposely exaggerated PYRAMID SUN SHADOWS cast from the MONTHLY ELEVATIONS (see page 16) looking North. The ray-lines roughly indicate the gradations of the Northern Sides of the monthly triangular shadow deflections from their apex to the Pyramid's base.

When the Equation of Time was nil, the side-rays would be practically equidistant from the *meridian line, as dotted* . . . . . , drawn at right angles from the centre of the Northern base of the Great Pyramid direct to the North Pole.

At the time of the Equinoxes *the Northern slope consumes its own mid-day-shadow;* whilst at all other times during the days of the Year the **constantly varying shadows** of the Pyramid would develop into an almost perfect series of all possible varieties of triangles, **regularly graded** with their apexes **indicating** the outline of a **recurring sequence of Seasonal Elliptic curves** (as shown by the - - - - line uniting the Cone's wing-tips on pages 52 and 56) in accordance with the **yearly motions** of the Earth at its fixed inclination round the Sun.

Thus the Apex of the Triangular Shadow would at every moment between Sunrise and Sunset truly indicate the progress of Time, both for Days and Seasons in every Year, as was essential for public welfare.

The Sun is shown to the left as vertically over the Equator at Mid-day *during the Equinoxes* when the Sun's rays, which per dotted top line reach the Great Pyramid at 30° N. Lat. on the Cairo meridian (outlined as the Earth's North curve quadrant), there develop that significant π angle which inevitably determined **the best shape of pyramid** for deflecting Sun-shadows **as the earliest and most reliable means of tracing the Seasons and length of the year,** which were obviously seen to be caused by the Sun's apparent movements.

The circle to the left represents the relative simultaneous day-times on the Earth when noon is on the meridian N.S., and the Sun's rays bound the circle at 90° West and East as there timed 6-0 a.m. and 6-0 p.m. respectively.

SUN-DIALS DEVELOPED FROM PYRAMID SHADOWS.

The slight Northern shadow edge variation from the almost perfectly united straight line proves that the true 60° Elevation was not attained, and as we know that the orientations shown are purposely not exact, whilst some little adjustment may be needed owing to the very great difficulty experienced in cutting the models to the real π shape, we can dimly realize the inexpressibly perplexing and arduous task the pyramid-builders experienced before their pyramids could be shaped to the essential Equinoxial slope.

Fortunately, York's maximum Sun Elevation of 59½° is sufficiently near to the crucial Equinoxial 60° required to test the π pyramid (C), that we can distinctly trace its characteristic North shadow straight lines, and note the close resemblance of the ray-lines from the Southern edges to the well-known outlines of the old Sun-dials, which, I think, later came into use through pyramid research after further investigation had proved that *a small single gnomon* (or "style") *fixed parallel to the Earth's axis would suffice for* SIMPLE DAILY TIME, though it would be altogether inadequate to determine the Seasons, to trace which the huge pyramids with their radiating "arris-line-edges" were designed.

The Ray-lines cast to the East and West of the π pyramid so strikingly resemble the hour-lines of the Sun-dial that they strongly suggest that the single gnome was evolved through the study of pyramid shadows, the two wings of which were thus united by using a single style, which shows the meridian noon-time every day the Sun then shines upon it.

The significant position of the Great Pyramid, as marked by π at 30° N. Lat. on the Cairo meridian curve of the Earth's quadrant shown opposite, accounts for its characteristic π shape, resulting from the Equinoxial Elevation of the Sun's mid-day rays, then only sloping sheer down the North side of the Pyramid thereby shaped as depicted by the topmost line from the Sun to π.

Early men were inevitably compelled to resort to the Equinoxial point as their most feasible basis of Solar research, because the Sun's apparent minutely varying Elevations are then at their *maximum*, showing along the sky-line nearly 180 times wider gradations than at the Solstices, towards which they gradually reduce to margins hardly distinguishable by modern astronomical instruments, as explained further on.

The mid-day Sun at lower (Winter) Elevations would cast shadows on the level shadow-floor, which is herein proved originally to have been purposely laid beyond the Great Pyramid's Northern slope, as represented by floor-squares to the right of the shaded side of the pyramid opposite.

HOW THE YEAR WAS MEASURED FROM THE PYRAMIDS.

Obviously, the first attempts to find the Year's length would be directed to gauging the number of days between the turning points of the Winter and Summer Solstices, half of the mean between which would naturally be expected to mark the Equinoxial points. The extent of the present ascertained variations between these could not be discerned until refined instruments were invented later, and as the Equinoxes thus appeared dependent upon the Solstices being first ascertained, we cannot doubt but that the latter absorbed the first attention of observers.

Further, the Summer Solstice point was incomparably more difficult to trace than the Winter one, which has so much lower elevations, giving vastly longer shadow or "sighting-line" records, hence we may expect that the Winter Solstice point would be taken as the first line of research, particularly as then the Sun is more on a level with the eye, which can then best bear that minimum glare of the Sun.

Bearing this in mind, I looked for the Dec. 21st and 22nd (Winter Solstice) noon Declinations in the *Nautical Almanac* for 1899, and found that they only varied 2″ (*i.e.*, 2″ ÷ 32′ 2″ (Sun's diameter) = ·00104, *or* $\frac{1}{961}$*st of the Sun's apparent diameter*), whilst between those two dates the resulting difference in length of the *shadow or sighting-line* to its tip cast from the maximum height obtainable of 484 ft. would only be ·01 ft., or about $\frac{1}{7}$th of an inch, when registered upon the meridian-North-ground-level.

This minute 2″ difference is smaller than usual this year—1894 was 4″ and 1900 will be 8″. Such could hardly be discerned by sighting; but as the Egyptians had these difficulties to solve in their day, we can readily see they had a most difficult task, and that it was imperative that they should attain the greatest possible height above a level measuring floor, because by doubling any height they doubled their registered differences, which could thus be detected.

This done, they would be disappointed to find by their experiments that the Sun appeared to hover for several days so near the Solstice points that the turning day could not be differentiated. Still, by prolonged experience, they would be able to approximate those points by averaging, and so help to fix upon the Equinoxes, which detailed examination of the daily gradations of Sun-shadows or sighting-line-tips would show were marked by about 180 times the daily zone change of Sun Elevations when compared with the Solstice turning zone, averaging but $7\frac{1}{2}$″ against the Equinoxial 23′ 31″ average measure of change.

This wide daily range at the Equinoxes would ultimately engross the attention of Pyramid observers, furnishing the basis of solution for their difficulty, which was yet very great owing to the rapid apparent motion of the Equinoxial Sun Declination of 58·8″ per hour (against about ·3″ at the Solstices), and the fact that the resulting wide gradations on the meridian line continue almost equal for about 12 days at the Equinoxes, during which it would be almost impossible to differentiate the Equinoxial zones, until their centre point was fixed by that prolonged experience of Solstice observations which their crude instruments and records entailed.

We may therefore rest satisfied that, although the fact of their getting so near their aim at the Solstices would no doubt hold them tenaciously to that line of research over a very long period, it was inevitable that later generations of Egyptians, should ultimately come to see that the Equinoxial gradations, *although intermediate*, and not so well defined as an apparent turning point in the Sun's course, were yet far more traceable, because, as we know, such gradations permanently hinged upon the Equinoxial almost *constant* daily difference in altitude of nearly 24′ 0″, whereas the complicated variations at the Solstices dwindled down to 2″, *i.e.*, about $7\frac{1}{20}$th of the Equinoxial 24′ 0″ change.

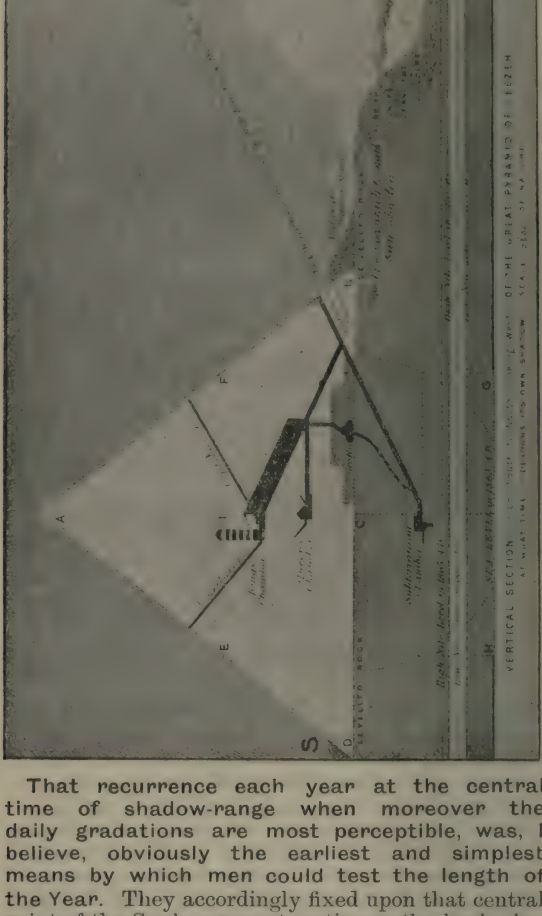
The graduated Yearly shadow deflections, outlined on page 60, could only be detected by shadows cast on a huge scale from a great height, hence for this purpose the pyramid had to be built to such a vast size.

We may easily see, by noting from shadowgrams A B and C, how the hour-lines cross in front of the pyramids, that close inspection of a series of these diagrams proves that it is not at all necessary to record the long morning (to the right) and evening (to the left) shadows, as the Seasonal variations could be as effectively and much more readily gauged by measuring the daily noon shadows on a level surface space placed due North of and adjoining the pyramid base during the six Winter months, between the Autumnal and Vernal Equinoxes.

The Sun's high elevation of 60° (when these diagrams were taken) does not cast shadows directly North of the π shaped models in Figs. C; but a glance at their East and West Wing shadows serves to impress the observer with the peculiar straight-line direction of their united Northern edges from the base to the right and left.

The Sun's Winter months' elevations at Cairo being below 60°, as per the Cairo column of the table of "Natural Gauges for the Sun," the true π pyramid there placed at exactly 30° N. Lat., would cast its Sun-shadows upon such levelled area North of the base, *because the sum of the Latitude and Sun's elevation do not reach* 90°.

As the Solar elevation decreased from the Autumnal Equinox these North-central shadows would correspondingly extend, until at 37° (the lowest elevation) their longest limit would be reached in the Winter Solstice. From thence, as the Sun gradually rose 23° to higher elevations, these mid-day shadows would accordingly decrease in length until **the Vernal Equinox was shown at 60° elevation by the Sun just over-topping and shining sheer down the Northern slope at mid-day**, as shown below, by Professor Piazzi Smyth's kind permission:—



That recurrence each year at the central time of shadow-range when moreover the daily gradations are most perceptible, was, I believe, obviously the earliest and simplest means by which men could test the length of the Year. They accordingly fixed upon that central point of the Sun's apparent motion as the beginning of their Year, and, counting the days thence until the direct North shadow was again consumed at the next Vernal Equinox, they would thus find out their annual periods and arrange their Calendar.

That is supported by the earliest recorded full Jewish Year, beginning at the Vernal Equinox and dating from the Exodus.

This diagram moreover gives still more interesting support to my theory by its illustration of **the North levelled rock platform thus proved to exist**, *which I hold was expressly provided to gauge the Sun-shadows.*

GREAT PYRAMID'S NORTH SHADOW-FLOOR.

Further, I infer that the top galleries hitherto regarded and marked as "ventilators" were observatory tubes, the *North* one at 30° marking the Latitude by "*sighting*" the Polar Star at the Equinoxes, whilst the Southern one was for "sighting" the mid-day Sun during its lower elevations near the Winter Solstice. *These all emphasize the Great Pyramid's Year-finding purpose.*

Before acquiring any detailed knowledge of the pyramids, my theory, as based upon natural experiments, required the existence of such a level area adjoining the North base; hence when, as a consequence of my having verbally explained to Dr. Tempest Anderson (York) how I thought the earliest men would find the length of the Year by Sun-shadows from high erections, he directed my attention to Professor Smyth's book on the Great Pyramid, the first thing looked for therein was to trace such level surface or floor.

The existence of this is conclusively proved by the 268 ft. length of levelled rock area shown to the right of the Vertical Section opposite; because, excluding for the moment the minor adjustments for refraction, etc., the longest shadow would be the pyramid's 484 ft. × 1·339 (co-tangent for the Winter Solstice Elevation of 36° 45′) = 648 ft., which, less the 380 ft. from the Great Pyramid's centre to its North base or Equinoxial line, leaves 268 ft. as the longest meridian range of shadow. That was amply provided for, as part of the stone rubble from the North-edge of the shadow-floor has been taken away by Cairo builders.

Notwithstanding the pyramid's great height, references to the "A B C shadow-grams," (where the chief hour lines cross so near the pyramid bases), and the periodical ray limits as proved per plate I. and II., demonstrate the fact that at 30° Latitude only about 90 yards width of North space was required to register the full series of testing shadows.

My interest in the question was stimulated by finding this decisive evidence of the existence of the requisite level area.

To follow up this evidence, proof of the existence of the "shadow-floor" had to be found. I was therefore still more pleased to find from Professor Smyth's photograph of the "Remnant of the Original Casing Stone Surface"—as shown by the lower half of the next page—that the floor was distinctly shown, as proved by the excavations of Colonel Howard Vyse in 1837. Further, its levelled stone flagging was shown to be laid along the North footing, not simply in square or oblong blocks of equal width, as would have been their easier way, but in alternate square and half-square pieces, which thus provide twice the number of angular junction points which the easier method would have given. By that arrangement of the first strip, and using square blocks for the remainder, the whole of the area

EXAMPLE OF THE CASING-STONES OF A PYRAMID, SUPER-POSED
ON THE RECT-ANGULAR MASONRY COURSES. FROM A PHOTOGRAPH BY P.S. OF THE SUMMIT OF THE 2ND PYR

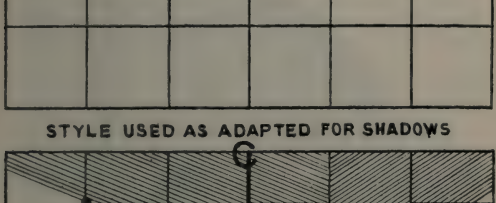
REMNANT OF THE ORIGINAL CASING STONE SURFACE OF THE GREAT PYRAMID
NEAR THE MIDDLE OF ITS NORTHERN FOOT. AS DISCOVERED BY THE EXCAVATIONS OF COL HOWARD VYSE IN 1837.

Reproduced by kind permission of Professor Piazzi Smyth and his Publishers, Messrs. Chas. Burnet & Co., London.

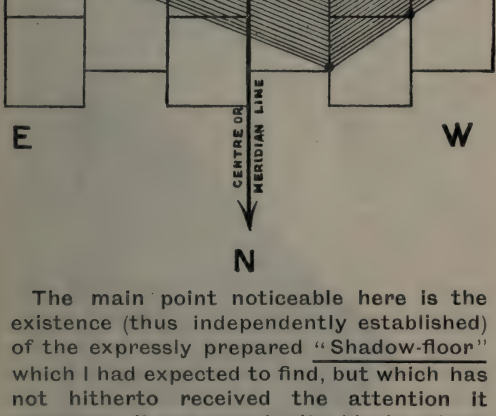
would be furnished with those duplicate joinings, which would so admirably serve as register points for recording the angular pyramid Sun-shadows.

The centre-line of this pavement being drawn midway from the North base side due North (C to N), would mark the meridian line from which the mid-day point of the Sun's curved course could be detected as its vertical diameter appeared marked above the apex of the pyramid, whose noon-shadow point fell on the meridian-line. That would overcome their initial difficulty of fixing the time of apparent mid-day.—The 11-0 a.m. shadow is roughly shown for contrast.

EASIER STYLE OF PAVEMENT



STYLE USED AS ADAPTED FOR SHADOWS



The main point noticeable here is the existence (thus independently established) of the expressly prepared "Shadow-floor" which I had expected to find, but which has not hitherto received the attention it deserves. It was paved with blocks whose widths approximate the inter-noon 4½ ft. gradation of the Sun-shadows, just before the Pyramid consumes its own shadow at the Vernal Equinox—the ancient Year's-end.

The lowest course of the tiered stones is 59 inches (5 ft.) thick. Higher courses vary somewhat, but generally reduce with the ascent until a thickness of 20 inches is reached at the top.

There seems wider traces of the floor squares in the area North of the 2nd Pyramid, but as obviously the Great Pyramid's floor would be the most perfectly laid and best material for building, it would be first taken up by the vandal builders of Cairo, as being far more accessible and handier for building purposes than the sloping pyramid casing stones.

Small Pyramids, demolished by rebels.

Third (?) Pyramid.

Second (?) Pyramid.

The Great π Pyramid—Highest, but appears foreshortened by distance.

By the kind permission of Mr. Frith, Author of "Lower Egypt and Thebes."]

THE PYRAMIDS OF GIZEH—from the South-West.

[and Mr. Wm. Mackenzie, Publisher, Edinburgh and Glasgow.

During the Winter months, as shown upon the Plate III. diagram, the Sun's lower Elevations between the Equinoxes (September to March) would, from causes already explained by the first diagram of the Sun's Elevations, gradually extend the mid-day shadows from the base up this meridian line to its longest limit at the Winter Solstice *(only 268 ft. range was required)*; after which they would daily recede to vanishing point at the Vernal Equinox.

But, it will be asked, how would they trace the course of the year by shadows during the six Summer months, when no shadow appeared North of the pyramid? The answer is—

First,—The pyramid-keepers would tabulate the days between the Equinoxes.

Second,—By sighting from the North side the position of the 9-0 a.m. (or other time) Sun over the N.E. arris-line, and its corresponding 3-0 p.m. position above the N.W. arris-line,—both viewed from the same standpoint on the central floor-line. (N.B.—Although clocks were unknown, they had obelisks, sand-rills, and water clypsedra to check the daily hours by.)

Third,—By systematically noting the inter-day graduations of the almost straight line course taken by the Northern edge of the π pyramid daily shadows, as indicated by the ray-lines upon Plate III., and shown more clearly by my π pyramid shadow-grams in Figures C.

These almost straight line North-shadow-edges, so peculiar to the π pyramid, furnished the most detailed and best means of noting the Sun's daily course during the six Summer months, because they could be so distinctly sighted from the N.W. and N.E. corners of the pyramid's base, and easily recorded by their graded deviations from the Equinoxial line being marked by moveable lines or cords. The Seasonal opening and closing of these lines at any required time would indicate to the keen eye of the pyramid-keeper the progress of the Seasons.

This check would, however, be rendered increasingly difficult to follow the further the slope departed from the true π shape in the pyramid used, as may be seen by comparing the North outlines of my Sun-shadow-grams A B and C, which, whilst straight in C, diverge in B, and become wide and jagged in A. They accordingly become more irregular the further the shadow-casting erection departs from the true π shape. Hence, probably the study and continuous development of these North-line-shadow-edges would be the designers' readiest guide towards realising the object of their repeated attempts to develop the perfect shape of the Equinoxial (π) pyramid as the ideal instrument by which the Sun's Yearly course could best be traced.

Through those persistent efforts the pyramid series was developed until it culminated in the most perfected forms at Gizeh, as illustrated opposite, where the distance makes the Great Pyramid appear smaller than it really is.

Plan of the GIZEH PYRAMID AREA (Smyth).

GREAT PYRAMID and SPHINX—from the South-East.

By the kind permission of Mr. Frith, Author of "Lower Egypt and Thebes." and Mr. Wm. Mackenzie, Publisher, Edinburgh and Glasgow.

In that view of the Gizeh Pyramids the Great Pyramid appears by perspective almost smaller than the so called second pyramid, which is really about 30 ft. less in height and 60 ft. less in the length of each side of its base, as may be seen by comparing the "Plan of the Gizeh Pyramid area," reproduced on the small scale of $\frac{1}{2100}$th of nature at the foot of the opposite page, by Professor Piazzi Smyth's kind permission, to show the relative sizes and positions of those pyramids.

The upper view of the Great Pyramid more truly represents its relative size when compared with the preceding illustration.

Had the view been from the exact South-East position the *arris-line-ridge* nearest the Sphinx (from which direction it inclines upwards) would appear mid-way up to the apex which unites the equi-distant North East and South West *arris-ridges* bounding the outline. The South and East slopes would then appear equal in perspective, whilst the Sun at 9·0 a.m. would shine equally on both.

Originally, when the pyramid was perfected with its polished casing stones, the bright, ever-recurring daily sunshine would be brilliantly reflected from the polished sides and arris-ridges, to show all the inhabitants of Egypt within a radius of about 40 miles their daily time, just as we now look up to a cathedral clock, *but with this difference, that then everybody had of necessity to take their Time from the Pyramid*, whereas now we have millions of clocks and watches by which to time our movements. Yet even these have to be adjusted by the Astronomers Royal at Greenwich and other Observatories, as was indirectly and less perfectly done in ancient times by the Pyramid priests of Egypt.—not merely for the day, but mainly for the year.

In brief, the pyramid was the great Almanac-finding instrument by which men discovered from nature the truer Year.

THAT TRUER YEAR TERM, AS THE GREATEST AND MOST USEFUL SECRET OF THIS WORLD, CALLED FORTH THESE MIGHTY WORKS DURING ITS LABOURED BIRTH TO HUMAN KNOWLEDGE.

The chief national and mystic value of the Great π Pyramid lay in its accurate Sun-reflecting power, which by the lengths and directions of its daily shadows as yearly displayed on such a huge scale upon the shadow-floor, disclosed to the learned and observant pyramid-keepers (the earliest Astronomers Royal) the lengths of the Seasons and annual progress of the Years.

The latter were differentiated by the graduations of the Equinoxial noon-shadow movements over the $4\frac{1}{2}$ ft. meridian gauge fixed upon the shadow-floor due North from the centre of the Northern base footing of the Equinoxial Slope, as next explained.

COMPARISON of EQUINOXIAL and SOLSTITIAL DATA for the Years 1899 and 1900, showing the SUN'S DECLINATIONS, and INTER-NOON DIFFERENCES in ELEVATION for 5 DAY INTERVALS on each side of the EQUINOXES and SOLSTICES.

	Date.	Sun's Declination. 1899.			Sun's Declination. 1900.			Daily inter-noon Differences in Elevation. 1899.		Daily inter-noon Differences in Elevation. 1900.		1900. In Seconds.	
		°	′	″	°	′	″	′	″	′	″	″	
Vernal Equinox.	Mar. 15	2	6	12	2	11	58	23	42	23	41	1,421	
	„ 16	1	42	30	1	48	17	23	42	23	41	1,421	
	„ 17	1	18	48	1	24	36	23	43	23	43	1,423	G
	„ 18	0	55	5	1	0	53	23	43	23	42	1,422	
	„ 19	0	31	22	0	37	11	23	42	23	42	1,422	
	V „ 20	**0**	**7**	**40**	0	13	29	**23**	**42**	**23**	**42**	1,422	E
	„ 21	0	16	2	**0**	**10**	**13**	23	40	23	40	1,421	
	„ 22	0	39	42	0	33	54	23	39	23	40	1,420	
	„ 23	1	3	21	0	57	34	23	37	23	38	1,418	
	„ 24	1	26	58	1	21	12	23	35	23	36	1,416	
	„ 25	1	50	33	1	44	48	23	33	23	34	1,414	
Summer Solstice.	June 15	23	19	18	23	18	37						
	„ 16	23	21	38	23	21	3	2	20	2	26	146	
	„ 17	23	23	33	23	23	5	1	55	2	2	122	
	„ 18	23	25	4	23	24	41	1	31	1	36	96	
	„ 19	23	26	10	23	25	53	1	6	1	12	72	
	„ 20	23	26	51	23	26	41	0	41	0	48	48	
	S „ 21	**23**	**27**	**7**	**23**	**27**	**3**	0	16	0	22	22	
	„ 22	23	26	59	23	27	0	**0**	**8**	**0**	**3**	**3**	**S**
	„ 23	23	26	25	23	26	33	0	34	0	27	27	
	„ 24	23	25	27	23	25	41	0	58	0	52	52	
	„ 25	23	24	5	23	24	24	1	22	1	17	77	
	„ 26	23	22	18	23	22	42	1	47	1	42	102	
Autumnal Equinox.	Sep. 17	2	14	32	2	20	15						
	„ 18	1	51	18	1	57	1	23	14	23	14	1,394	
	„ 19	1	28	2	1	33	44	23	16	23	17	1,397	
	„ 20	1	4	43	1	10	25	23	19	23	19	1,399	
	„ 21	0	41	23	0	47	5	23	20	23	20	1,400	
	„ 22	0	18	1	0	23	42	23	22	23	23	1,403	
	A „ 23	**0**	**5**	**22**	**0**	**0**	**19**	**23**	**23**	**23**	**23**	1,403	E
	„ 24	0	28	46	0	23	6	23	24	23	24	1,404	
	„ 25	0	52	10	0	46	30	23	24	23	24	1,404	
	„ 26	1	15	35	1	9	55	23	25	23	25	1,405	G
	„ 27	1	38	59	1	33	20	23	24	23	25	1,405	
	„ 28	2	2	22	1	56	43	23	23	23	23	1,403	
Winter Solstice.	Dec. 16	23	19	53	23	19	11						
	„ 17	23	22	15	23	21	40	2	22	2	29	149	
	„ 18	23	24	9	23	23	41	1	54	2	1	121	
	„ 19	23	25	35	23	25	13	1	26	1	32	92	
	„ 20	23	26	33	23	26	18	0	58	1	5	65	
	„ 21	23	27	2	23	26	54	0	29	0	36	36	
	W „ 22	**23**	**27**	**3**	**23**	**27**	**2**	***0**	**1**	**0**	**8**	**8**	**W**
	„ 23	23	26	36	23	26	41	0	27	0	21	21	
	„ 24	23	25	41	23	25	52	0	55	0	49	49	
	„ 25	23	24	17	23	24	35	1	24	1	17	77	
	„ 26	23	22	25	23	22	50	1	52	1	45	105	
	„ 27	23	20	5	23	20	36	2	20	2	14	134	

(V) Vernal Equinox, March 20th | **(S)** Summer Solstice, June 21st
(A) Autumnal Equinox, Sep. 23rd | **(W** Winter Solstice, Dec. 22nd

Bolder figures are shown for the Equinoxial and Solsticial days.

E—*The two Equinoxial Days together average* 23′ 32″ = 1412″ *change.*

G.—The fact that the greatest Differences (shown by bolder figures) occur about 3 days before the Spring and 3 days after the Autumnal Equinox (up to which the graduations increase and after which they decrease) would puzzle the Ancients.

The "Declinations," etc., are here seen to vary slightly from Year to Year.

* Between noon on December 21st and 22nd, 1899, the Elevation only varied 1″ of the arc, *i.e.*, $\frac{1}{1922}$nd of the Sun's apparent diameter. That 1″ infinitesimal margin is also the difference between the Winter Solstice "Declinations" in 1899 and 1900

NOTE.—The last column demonstrates in seconds of the sky-arc, the *large continuous inter-noon differences in the Sun's Elevations at the Equinoxes* where they *are practically uniform each Year*, whereas the *exceedingly small differences at the Solstices are graduated erratically in consecutive Years* and could neither be traced nor understood.

Again, allowing for the unit adjustment of fractions to the *nearest second*, the Summer Solstice difference of 6″ is additive to the 1899 differences for the 1900 figures up to June 21st, after which it is subtractive. The 7″ differences at the Winter Solstice are likewise added up to December 22nd, after which they are similarly reduced from the 1899 Differences in Elevation.

The precessional drifting of the Equinoxes from "the 1st point of Aries" is shown by the British Government's "Nautical Almanac" record of the "Mean Time of Transit" being:—

	h.	min.	sec.	h.	min.	sec.
In 1899, March, 22nd ...	0	0	54·62	23	56	58·71
„ 1900, „ „ ...	0	1	51·80	23	57	55·89

WHY an EQUINOXIAL INTER-NOON SHADOW-GAUGE of about 4½ ft. was necessary to DIFFERENTIATE THE YEARS and thereby DETERMINE THE TRUE LENGTH OF THE YEAR.

The last column of the comparative data tables opposite, contrasts the great Equinoxial daily changes, marked **E,** with the minute difference at the Solstices **S** and **W.**

I have already demonstrated that the apparent hovering (almost standing) view of the Sun at the Solstices rendered its minute changes of elevation practically imperceptible until astronomical instruments were highly developed, and that as the *average* Equinoxial inter-noon change was about 180 times greater, the priestly observers were *bound to ultimately resort to studying the Equinoxes* (to which they would also be directed by the then prevailing equal length of day and night), to find the length of the Year, because their chances of success then were 180 times greater than at the Solstices.—Extreme Years show as far as 1422″ Equinoxial difference against but 1″ Solstice change (*), *e.g.*, on December 22nd, 1899, the Winter Solstice inter-noon change was only 1″ which was but $\frac{1}{1422}$nd of the like difference at the Vernal Equinoxes V E in 1899 and 1900.

The Daily Differences in the Elevations at the Solstices *are so small and erratic* that ancient observers could not thereby define the Sun's turning point, but had to resort to the study of the Sun's greatest daily changes in Elevation at the Equinoxes, when they are about 50% more than the yearly average of *15′ per day, and 180 times more than on the average of Solstice days.*

The opposite comparison of the Equinoxial differences in Elevation shows the changes are greater at the Vernal Equinox than during the Autumnal Equinox; therefore, as the former can be better observed, and was more marked to the ancients by the springing vegetation, we take its 23′ 41·7″ difference to the *nearest second* of 23′ 42″, as sufficiently near for practical purposes.

The inter-noon differences between the tips of the "*shadow or sighting lines*" at the Equinoxes and Solstices in Ancient times could only be noted by means of shadows diagrammed and recorded from the huge pyramids and cones erected, though our perfected protractors and other mathematical instruments enable us to demonstrate those differences by huge diagrams which, however, cannot be reduced to come within these page limits without making the illustration too small to be seen; we therefore first resort to modern mathematical demonstration by figures—(ignoring for the moment the trivial allowance due for refraction, etc.), and later illustrate their meaning to the eye, by an approximate diagram.

To find the *daily difference in the length of Shadow* which the 23′ 42″ change will cause, the fact that in different years the true Equinox occurs some hours *before* or *after* noon for which the Sun Elevations are recorded, has to be borne in mind, as the 60° Cairo (Pyramid) Equinoxial Elevation is timed for *noon;* therefore as the *Equinoxial Slope* would slice off the shadows at mid-point we take the 23′ 42″ value from the mean of its *co-tangent* ratios on each side of 60°.

The Meridian Altitude of the Sun at the Great Pyramid during the Equinoxes being 60°, we take from the mathematical tables the *Co-tangents, and deduce the differences,* to get the difference in the Shadow-lengths proportionate to the pyramid's height, thus:

Mean of 24′ Difference.		Co-tangents.	Differences.	Mean Differences.
−24′	59° 36′	= ·58670		
			·00935	
	60° 0′	= ·57735	·00927	·00931
+24′	60° 24′	= ·56808		
Mean of 23¾′ Difference.				
−23¾′	59° 36¼′	= ·58650		
			·00915	
	60 0′	= ·57735	·00908	·00911
+23¾′	6 23½′	= ·56827		
				2)·01842
∴ 23¾′ as the Mean between the above sets =				·00921
As 23¾′ = 23′ 45″ we are still 3″ above the 23′ 42″ Equinoxial Inter-noon change, we *deduct* − 3″/23′ 45″ = 3″/1425″ = 1/475 th of ·00921 =				·00002
∴ **V E** 23′ 42″ difference in Elevation has a Co-tangent ratio difference of				·00919
which, x by the Great Pyramid's height of				**484**ft.
shows for the Great Pyramid's latitude an				3 6 7 6 7 3 5 2 3 6 7 6
Equinoxial Inter-noon shadow gauge of				**4·44796**ft.

This reduced for convenience we call the

"4·45 ft. Gauge."

At first sight the Great Pyramid's 4·45 ft. gauge may seem unnecessarily large, but that surmise promptly disappears upon examination of the factors and complex difficulties pyramid observers had to contend against.

Now, had the Pyramid only been built to half its natural height the Equinoxial inter-noon change or gauge by the length of the Pyramid's shadow would only have been half the above, or 2·22 ft., which could never have sufficed to elucidate the ·24219 fractional day length of the 365·24219 days' "Solar Year."

Even by the huge scale to which the Egyptians raised this the Greatest of Pyramids, they would still have very great difficulty in understanding and drawing intelligible inferences from these Equinoxial Shadows as the Spring and Autumnal lengths varied each Year, and moreover a full Year separated the vital Vernal Equinoxes, whilst the pyramid-keepers then did not know the true length of that Year which thus separated them and mystified the whirl of Time.

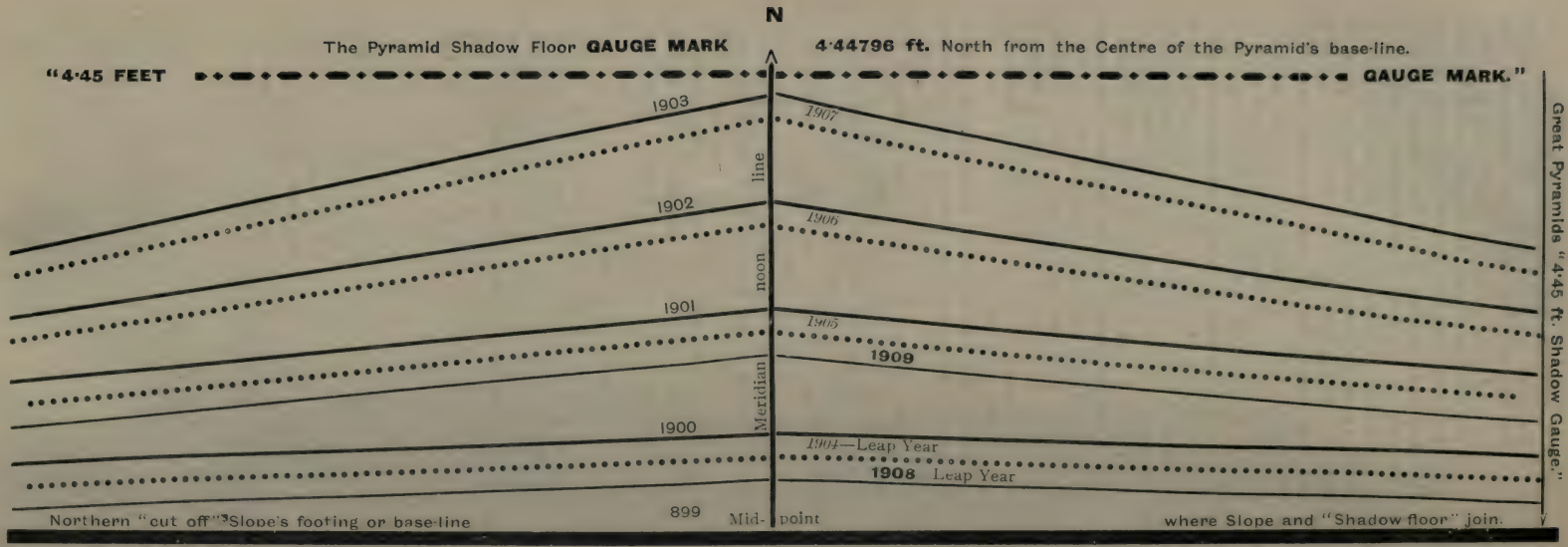
Each Year being 365·24219 days long, it is impracticable to adjust the ·24219 fractional day part beyond the 365 days, except by the addition of *leap*-year-day nearly every 4th Year. That previously unknown or undefined ·24219 oddment would unavoidably cause the Equinoxial noon-shadow of the Great Pyramid to vary over the 4·45 ft. Equinoxial gauge.

Assuming that the *Vernal* (Spring) Equinox in 1899 appeared exactly at Cairo noon, then at noon on March 19th the apex of the pyramid's shadow would have been marked upon the "meridian line" on the shadow floor, 4·45 ft. from the centre of the Northern slope's foot, whilst at noon on March 20th the Equinoxial shadow would exactly disappear at the foot of the slope, as the Sun shone just over the pyramid's top "when the pyramid just consumes its own shadow"—(as was proved by Professor Piazzi Smyth, the late Astronomer Royal for Scotland, though he does not seem to have discerned the significance of that fact, as will be explained later.)—Thus the "4·45 ft. gauge," already derived, marks the difference between Equinoxial noon on two *consecutive days*.

But the difference in the graduations of the Equinoxial noon-shadows for *consecutive Years* would be varied and advance ·24219 times the length of this 4·45 ft. inter-day difference in length of the shadow, because the length of the Year is not 365 days only, but 365·24219 days; consequently at noon 365 days after (*i.e.*, March 20th, 1900) the Sun will not have quite reached the former 1899 Elevation: therefore its rays will not quite peep over the top of the pyramid, but being behind, will cast a shadow equal in length to the decimal fraction ·24219 of the 4·45 ft. Equinoxial inter-day gauge, which yields about 1·07725 ft. as the distance to which the shadow would extend up the "Meridian line" from the mid-footing of the Northern slope on March 20th, 1900.

On the same date in 1901 the Sun would appear a further ·24219 of a day behind and so be another step behind its 1899 noon Elevation, therefore the shadow would reach about 4·45 ft. × ·24219 × 2 = 2·154 ft. In 1902 the shadow would be about 3·232, and in 1903 about 4·309, but before March 20th, 1904 was reached, the shadow would have crossed the "4·45 ft. gauge" and 366 days for Leap Year would intervene, throwing the Equinoxial noon-shadow back to March 21st (*if "leap-day" had not been inserted to throw back the date to March 20th*) when the shadow would only be about (4·45 ft. × 5)— **4·44796 ft.** = ·938 ft. up the Meridian line from the pyramid's base, causing the shadows for the following Years to register at entirely different points within the critical "4·45 ft. gauge."

Not only would the testing Equinoxial shadows vary over this 4·45 ft. gauge, as per the following diagram, but their *Yearly* North direction of advance along the Meridian line from the pyramid's base, would be in direct opposition to the Southern progression of the *daily* shadows approaching their vanishing line at the foot of the pyramid's Northern slope.



Rough **DIAGRAM** of the **GREAT PYRAMID'S** annual **"SHADOW TESTS"** to trace the **YEAR'S END MARKS** by the **20th MARCH SHADOWS** in the years **1899/1909.**

Such varying and perplexing movements being aggravated by uncertainty and lack of knowledge, precluded the possibility of the true Year's length being discovered, until by centuries of experiments in pyramid building and keeping records, the Egyptians obtained reliable data upon which to form conclusions.

To show the puzzling measures of these shadows, tested over the fullest "4·45 ft. gauge" attained, I have worked out for *March 20th* noon, their lengths in figures for the following 10 years, though their variations will be best understood by the rough diagram opposite, where the critical shadows for 1899 to 1903 are outlined by heavy rules, 1904-1907 by dotted rules, and 1908-9 by thin rules.—— All except the "Leap Years" 1904 and 1908 being counted at 365 days per year.

Year.		Length of Shadow and Remarks.
1899	Mar. 20th.	No shadow—Sun shines over North slope.
		Feet.
1900	„ The shadow would be	1·07725 Away from base.
1901	„ „ „ „ „	2·15450 „ „
1902	„ „ „ „ „	3·23175 „ „
1903	„ „ „ „ „	4·30901 Near Gauge line
1904	„ „ „ „ „	5·38626 Over Gauge line
	Old date (Leap Year)	**Less 4·44796** Deduct Gauge
	366 days are counted in 1904, as "Leap-day" is added by an extra day's shadows being shown.	length, as the shadows have gained a day.
	„ Mar. 20th. Shadow is thus	
	(March 21st if "Leap-day" had not intervened.) thrown back to	·93830 Begins near the pyramid's base.
1905	Mar. 20th.	
	The shadow would be	2·01555 Away from base.
1906	„ „ „ „ „	3·09281 „ „
1907	„ „ „ „ „	4·17006 Nearing gauge.
1908	„ „ „ „ „	5·24731 Over Gauge line
	Old date (Leap Year)	**Less 4·44796** Deduct Gauge
	Again counting 366 days in "Leap Year."	for day gained.
	„ Mar. 20th. Shadow again	
	(March 21st if "Leap-day" had not intervened.) thrown back to	79935 Reverts nearer to the base-line.
1909	Mar. 20th.	
	The shadow would be	1·87660 Away from base.

It may here be noticed that the "Leap Year" could thus be automatically noted, whilst the yearly "March" or progression of the Years was evidenced by the noon Shadow-tip of the 20th March, as the 365th or last day of the old Egyptian Year, advancing along the gauge about 1 foot each ordinary Year.

It will be noticed that the progression of these "noon-points" along this gauge still vary from Year to Year, beyond the "Leap Year's adjustment," *e.g.*, 1900 is 1·07 ft. from the gauge mark, whereas 1904 is ·93 ft. or ·07 short of the 1 ft. against the former's ·07 further than the 1 ft. rough yearly difference.

These minute yet constantly varying yearly gradations could not be understood until the wide "4·45 ft. gauge" was secured by building the Great Pyramid, and the differentiation of the Equinoxial shadows systematically studied by detailed records over many Years; because with the uncertain and almost incomprehensible length of the Year between each record, no observer could elucidate the "Year term" until the records were graphically grouped together for comparison, as I have attempted to do upon the opposite page.

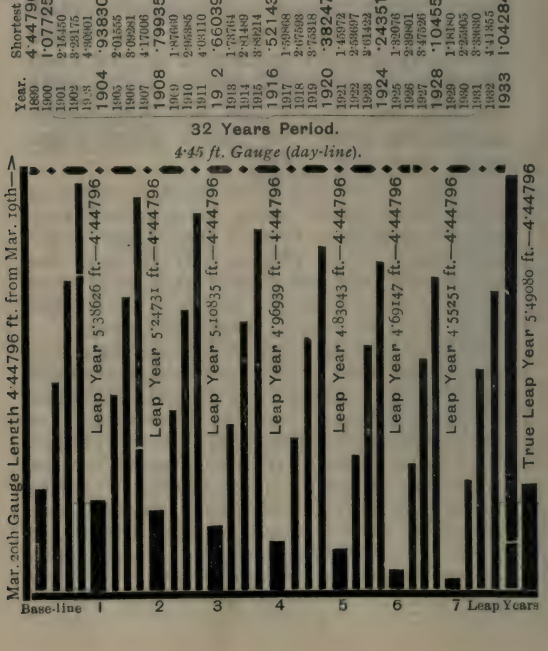
But it was not even necessary that the primitive Egyptians should understand how to draw such a series of triangular diagrams over-lapping each other. The vital need most strongly suggested to their minds, would be to record the shortest Equinoxial noon-shadow's length up the *meridian-line*,—a term which most probably arose at the pyramid, where the apex of the shadow falling upon that *middle-floor-line*, indicated at once *mid-day*, the direct North and South line, and the Sun's highest point before declining after noon.

For that purpose nothing could be simpler nor handier than for the pyramid-keepers to take a stick or rod to measure the length of the *shortest noon shadow* each year, and cut it off at the exact length of the shadow, afterwards storing it safely for comparison with like rods similarly cut down to the lengths of the *shortest* shadow at the Spring Equinox in each succeeding year.—These marked by numbers or hieroglyphics to denote each year, would then be filed in consecutive order.

Now whether those *year-end-rods* gauged within the "4·45 ft. gauge," were placed horizontally or vertically for permanent reference, *they would show at a glance* the remarkable lengthening of *three successive yearly shadows*, followed by the very significantly indicated *shortest* shadow at the 4th year's-end, as below:—

TABLE of SHORTEST YEARLY SHADOW LENGTHS cast from the GREAT PYRAMID, shown by a proportional "SCALE of Equinoxial SHADOW-RODS."

Year.	Shortest Shadow.
1899	4·44796 feet.
1900	1·07725 "
1901	2·15450 "
1902	3·23175 "
1903	4·30901 "
1904	·93830 "
1905	2·01555 "
1906	3·09281 "
1907	4·17006 "
1908	·79935 "
1909	1·87660 "
1910	2·95385 "
1911	4·03110 "
1912	·66039 "
1913	1·73764 "
1914	2·81489 "
1915	3·89214 "
1916	·52143 "
1917	1·59868 "
1918	2·67593 "
1919	3·75318 "
1920	·38247 "
1921	1·45972 "
1922	2·53697 "
1923	3·61422 "
1924	·24351 "
1925	1·32076 "
1926	2·39801 "
1927	3·47526 "
1928	·10455 "
1929	1·18140 "
1930	2·25865 "
1931	3·33590 "
1932	4·41315 "
1933	1·04284 "


32 Years Period.
4·45 ft. Gauge (day-line).
Mar. 20th Gauge Length 4·44796 ft. from Mar. 19th—
Leap Year 5·38626 ft.—4·44796
Leap Year 5·24731 ft.—4·44796
Leap Year 5·10835 ft.—4·44796
Leap Year 4·96939 ft.—4·44796
Leap Year 4·83043 ft.—4·44796
Leap Year 4·69147 ft.—4·44796
Leap Year 4·55251 ft.—4·44796
True Leap Year 5·49080 ft.—4·44796
Base-line 1 2 3 4 5 6 7 Leap Years

On MARCH 2nd, 1902, the Noon Shadow extended up the MERIDIAN ROD **4 ft.** beyond the foot of the Pyramid's Slope, but at noon on the following day the SHADOW HAD VANISHED and could not re-appear until after the next Equinox, because the Sun had risen 0° 23′ within 24 hours, thus shortening the Shadow over 4 feet as measured by the pebbles on the Rod.

Readers will thus see how obviously plain and suggestive was this simple, yet exact, method of measuring the year, by cutting off the Shortest receding shadow-lengths on the Meridian Rod to decide and keep record of the apparently varying fraction of a day required to complete the Year after counting the intervening days.

PHOTO showing how the GREAT PYRAMID'S shortest Yearly receding Shadow was measured on the MERIDIAN ROD to find the YEAR'S LENGTH to form the ALMANAC.

It would hardly be reasonable to expect readers to go through those long years of experiments and reasoning which led me to the conclusion that the Equinoxial-Sloped-Pyramid was the almost inevitable means which early men had of necessity to use to enable them to locate the right times for sowing seed, etc., to ensure the food and comfort of their Race.—But some idea of the force of that necessity may be formed by considering the vast importance of the Sowing, etc., Seasons recorded on the Extracts from the "Egyptian (Coptic) Calendar," purposely printed inside the back-cover, especially if they rightly estimate the full force of historic evidences of Famines caused through lack of exact knowledge of those seasons amongst early peoples, as evidenced by the Bible, Egyptian, Babylonian, Assyrian, Indian, Chinese, Mexican, etc., records, and so strongly confirmed by the most stupendous works there raised by early races to derive and maintain true Almanac or Seasonal knowledge direct from the Sun's shadows, when they all naturally believed that the Season's were caused by the Sun's changing Elevations throughout the Season's of the Year.

Some of the friends who saw my proofs in 1899 doubted whether the Pyramid's Shadow showed strong enough to be clearly measured, knowing how feeble the shadows show in England, and how imperfectly the shadow-edges of church spires, poles, etc., are seen. It was, therefore, very important to test that to prove the practicability of my theory.

Unfortunately, when ordered to Egypt to restore my health, I could not choose the Spring Equinox *as I would have done*, but had to go in November, 1900, when the Pyramid's Shadow was very long, but still local inspection convinced me that the March shadow length could be registered upon the shadow-floor even in its present rough state. I took some photographs, but unfortunately my camera was stolen whilst I was consulting Professor Maspero at the Gizeh Museum. As business necessitated my return within a month, I could not stay till March, therefore I tried to arrange for the critical photographs to be taken for me at the Spring Equinox, but experienced much difficulty in making my directions clear to the photographer and my most excellent guide, Aly Gabry, as I could only speak English.

The photographic proofs had consequently to be deferred in expectation that they would be got about March 21st. That failed, because as recorded in the introduction I had misunderstood Professor Piazzi Smyth at my first interview to say that the Pyramid consumed its own shadow about the 25th March, whereas he evidently meant the 5th March as reference to a Nautical Almanac (to which he referred) makes that clear, because the Sun's *South* Declination of 7° on March 5th added to the 52° Slope of the Pyramid practically registers the Sun's Equinoxial Elevation of 60°, whereas its March 25th *North* Declination of 2° beyond the Equinoxial 60° registers 62° as the Sun's Elevation, *which, being* 10° *above the Pyramid's* 52° *Slope*, would preclude the possibility of any meridian (noon) shadow

being then cast. Indeed, the noon-day Sun always shines above the Pyramid's Apex after March 4th, as my photographs conclusively prove.

Most probably the Nautical Almanac, to which Professor Smyth referred, contained the record of his own observation of the fact that the Pyramid's Noon Shadow had disappeared on March 5th in the year he noticed that significant fact, for we must remember that the Leap Year adjustment of our Almanac to the ¼-day-longer Solar Year causes the shortest shadow to fall an Almanac-day later every 4th year, as registered upon the shadow-floor's day gauge. Hence it seems evident that as the Professor's words were muttered in his feeble way, with a "tuh" sound before the words where he took breath, I must have misunderstood 25th instead of 5th—much to my loss, as considerable expense and delay were occasioned thereby.

It would be unreasonable to expect that casual readers would fully appreciate the difficulty of fixing the Pyramid's present Shadow Slope (much less the far greater problem the Pyramid Builders had to face when deciding upon the Pyramid's Slope), but they may partly realize some measure of that difficulty when I add, that after our failure to photograph the shortest shadow in March through my directions being given for the 25th instead of the 5th, I wrote that eminent Egyptian investigator, Professor Petrie (whom all well-informed Egyptologists recognise as having made the most exact Pyramid measurements), and he advised me by letter in October, 1901, as detailed later, that astronomically the shortest shadow should disappear on February 27th and re-appear on October 14th, whereas my photographs here reproduced as taken on March 2nd and 3rd, 1902, prove with ABSOLUTE CERTAINTY that the critical shadow disappeared on March 3rd, 1902.

Now as the original Casing Stones and Apex of the Pyramid are missing, it seems obvious to me that the present broken slope of the Pyramid inclines to the Sun at a slightly lower angle than the original completely-cased Slope did; therefore, had the Pyramid still remained perfect, the sun would have had to rise higher before the shortest shadow would then have disappeared a day or two later.—Hence, owing to Refraction, etc., the Shadow-register appears to fall a little later than expected from Astronomical Data, and a corresponding time earlier in the Autumn.

That unexpected earlier appearance of the Autumnal Shadow pre-dated my arrangements in the Autumn of 1901, and as the first Autumnal Shadow appears so suddenly, whereas the receding March Shadows can be steadily watched, I felt satisfied that the shortest Spring Shadow would mark the time from which the Pyramid priests would count their year. My efforts were therefore directed towards securing the photographic record, which resulted through the kind help of Professor Maspero and the careful way in which Mr. Quibell, the Chief Inspector of the

Antiquities Department of the Egyptian Government, and Mr. Dozsay, the Pyramid Photographer, carried out my wishes.—To all of these I tender hearty thanks.

Originally the Pyramid's 52° Slope cut off the shortest shadow at the Equinox (March 21st); now it falls on March 2nd or 3rd, proving that during about 5,000 years there has been a change of 7° to 8° in Latitude as evidenced later.

The limited space in this four-page insertion between pages 78 and 79 (plain-numbered pages to 176 having been printed before my visit to Egypt) here precludes detail, which may be found after page 176, as since then my further investigations in Syria, Rome, etc., enabled me to trace further evidence of this shadow-method of recording time, having been handed down to us from ancient times.

These, briefly summarised below, may assure readers that definite evidence (which, though desired, I hardly expected to find) is forthcoming to substantiate my theory that the Pyramids were built for the great purpose of tracing out the Seasons and developing the Calendar from which our Almanacs were derived:—

1. King Shafre's "Sun-well" at the Great Pyramid and that of Eratosthenese at Syene (Assouan).

2. "Sundial" of Ahaz used by Isaiah and Hezekiah.

3. "Sun-holes" used at the Monastery of the "Burning Bush" (Sinai) at Baalbeck, Damascus, the Church of St. Paul's, Rome (near Railway Station), the Church of Brindisi, the Milan Cathedral, the Madrid Cathedral, the Antwerp Cathedral in Pope Gregory XIIIth's (Almanac Reformer) window, Durham Cathedral, etc.

The counterpart of these "Sun-holes" is always a "meridian-line" cut in the floor as on page 88, *where P represents the "Sun-hole."*

4. The emphatic confirmation made clear by the marble meridian-line cut through the roadway in front of St. Peter's, Rome, where the shadow of the Ancient Egyptian Obelisk there erected, not only falls on that meridian-line at noon, but the actual length of that shadow is plainly denoted by marble discs placed at the shadow tip for each month, and, most important of all, the shortest and longest shadows at the Summer and Winter Solstices are most distinctly lettered as "Canceri" and "Capricornus," respectively denoting the names of the Tropics, which mark the extreme vertical path of the Sun.

5. The evidences of the Mexican records proving the Ancient American Calendar Stone was used with Shadow Pins.

6. The astronomical Time methods of Ancient Chinese, Druids, Hindoos, Mexicans, Peruvians, etc.

7. The use of Sundials and Shadows from high erections throughout the world.

8. The conclusive evidence of the Almanacs which printed the lengths of seasonal shadows, as detailed in the last columns of page 32 and the last page of the "Bible Ages" (pink) section.

These presently may satisfy readers of the truth of my conclusions, but, meantime, having proved by photograph the efficacy of the Great Pyramid's Shadows, we resume consideration of the precise Pyramid Shadows, which, being cast from the height of 484 ft., enabled the Pyramid priests to locate the Seasons and measure the Year about as precisely as modern Telescopes now enable our Astronomers at Greenwich, etc., to do to our great benefit.

(For evidences of "change in Latitude," see after page 176).

"LEAP YEARS" and YEARLY FRACTIONS of a DAY beyond the crude 365 DAYS' YEAR, indicated by the shortest yearly lengths of "SHADOW-RODS."

Here we may see that in the 32 years between the medium thickness of rods (specially marked for the years 1900 and 1932), where we should record $32 \div 4 = 8$ "Leap Years," only 7 "Leap-days" and over $\frac{3}{4}$ths of another have accumulated; therefore the series of thickest and shortest "Sun-shadow-rods" show nature's shortest shadow for "Leap Year" as falling in 1933, as the 1932 shadow being 4·41355 ft. ÷ 4·44796 ft. (the day-gauge length), proves that only the fraction ·992 of the gauge's 8th "Leap-day" or literally 7·992 days have accumulated in the 33 years from 1899 to 1932.

Those varying yearly lengths of "Shadow-rods" being gauged from the yearly altering footing of the Sun's Equinoxial noon-shadows, clearly prove that the critical noon slope slightly changed its angle from year to year, and show that the "EXACT" "Equinoxial noon-slope" would only be indicated by the Sun once in a cycle of about 32 years, or more truly defined in about 128 years, whilst even then it would be impossible to fix upon the requisite Equinoxial slope until after long experience and repeated failures in pyramid building.

After the 32nd year (as shown opposite for 1932) or truer 128th year had proved the exact Equinoxial noon-slope, the next following year's shortest shadow unmistakably proved to sight and reason, the fact that upon this gauge as a day measure was shown the nearly $\frac{1}{4}$-day extra shadow, indicating that after the intervening 365 days the Sun yet required to take nearly $\frac{1}{4}$ day longer to reach its Equinoxial height; the next year's $\frac{1}{4}$ gauge shadow proved it to be another $\frac{1}{4}$ totalling nearly $\frac{1}{2}$ a day behind, and so on, the true cumulated fractional length of the day oddment beyond the 365 days was increased, until near the 4th year 366 days were counted before the shortest annual shadow denoting "Leap Year" fell within the gauge,—that year's 365th day's shadow having passed beyond the "4·45 ft. gauge."

The lengths of the "Shadow-rods" (cut for the 20th March each year) ranged consecutively as shown opposite between the "base-line" and the "gauge-line" 4·45 ft. above it marking the "day-line," demonstrate most conclusively the actual fractional parts of the day beyond the 365 days in each ordinary (thin rod) year, and beyond the 366 days in the "Leap Years" denoted by the thick rules numbered 1 to 7.

HOW THE YEARLY ODDMENT OF A DAY beyond the Vague 365 days' Year COULD BE DETERMINED FROM THE PYRAMID'S EQUINOXIAL SHADOWS.

By this the most plain and simple means which men could possibly devise, the Pyramid-keepers would each year-end be able to read the cumulating fractions of a day, as pointed out direct by natural shadows of their Sun-God's movement within this "4·45 ft. gauge."

Neither nature nor the inventive powers of man have ever produced any other graphic or intelligible expression of the puzzling working of the ·24219 day oddment or fraction of the year's length, at all approaching the perfection of this "pyramid-rod-system" of progressive record.

No other system can be equal to, nor fairly comparable with this vividly realized "Shadow-rod" scale of the real fractions of a day actually over-lapping each year-end, when inevitably counted by noon-times, as the rod-lengths are taken inversely by shadows cast direct from man's greatest work in the Pyramid (built for that express purpose) by the Sun, as the obvious central cause and force controlling the length of the Year, which men were forced to thus find out from nature.

Despite all their besetting difficulties, the Egyptian leaders in "Year research" had to persevere in sifting the tangle of meagre conflicting evidence, amidst the inevitable disputations of different dogmatic observers, the breaks in continuity caused by death in the line of the priestly "Pyramid-keepers" (*who kept such knowledge secret* before written records were possible), and many other drawbacks impeding progress and baffling continuous efforts to define the true fractional day term of the Year; but ultimately cumulated evidence and study of the Equinoxial graduations over the "4·45 ft. gauge," would by averaging, disclose the Yearly oddment of a day as definitely less than the crude ¼-day we still popularly speak of, but the decimal ·24219 day fraction could only be explicitly expressed by geometric signs until mathematics were highly developed in later centuries.

Yet I submit that the value of that fraction could be geometrically realized by the Egyptians simply drawing lines touching the tops of the four sloping series of rods, and noting that $\frac{24}{100}$ths of the gauge separating those lines.—That would be nearly as good as the other method of dividing the before-mentioned extra cumulated 7·992 "Leap-days," by the "33 years' period" in which they fall between the first full gauge rod and the almost equally long 1932 rod, to get the ·24219 day per year oddment beyond the vague 365 days' year, which the toiling mass of Egyptians under the Pharaohs were bound to adopt to suit their system of counting by the five digits of the hand.

Study of the crude and cumbersome arithmetical records of the early Egyptians makes us more than doubt their ability to find that ·24219 day oddment *by calculation* within 32 years after the Great Pyramid was built.

It is far more probable that before sufficient accuracy could be derived, a whole series of 128 years would have to be studied, because in that period the "Leap Year" shadows when traced back would have risen from *zero* at the *base-line* to the full "4·44796 ft. gauge line."

That may be seen from the fact of the 1900 medium rod being only one quarter the length of the 1932 medium rod, and the short thick set "Leap Year rod" gradually mounting backwards to that *quarter-length* of the front full gauge in 32 years,—showing that like Aaron's rod (1st recorded Egyptian miracle, Exodus VII., 12) it swallowed up all the rod-lengths within the gauge.

Now, as in counting backwards, the "Leap Year" shadows rose to $\frac{1}{4}$th the day-gauge length in 32 years, they would reach the full gauge length in 32 years × 4 = 128 years. That is confirmed by taking $\frac{1}{4}$ day (the annual fraction we take by "Leap Years") = ·25—·24219 (the true fraction) = ·00781, which divided into 1 (unity) also equals 128 years as the period within which the $365\frac{1}{4}$ day-years, compounded as 366 days for Leap Year only, would by the excess of ·00781 day per annum, have *over-stepped nature's time by 1 day.*

That is why we leave out the "3 Century Fourth Year-days" in each 400 years and only include those century years as "Leap Years" which are divisible by 400. *In brief, non-century years evenly divisible by 4 are "Leap Years," whilst only "Century Years" evenly divisible by 400 are "Leap Years."* e.g., 1700, 1800, and 1900 were *not* counted as "Leap Years" whilst 2000 and 2400 will be "Leap Years."

By that means we drop 3 days in 400 years or ·0075 day per year, which being ·00031 day less than the above ·00781 day per year excess beyond the Solar Year, would if every 4th year was perpetually counted as Leap Year, cumulate the error to 1 day in $\cdot\frac{1}{00031}$ = 3226 years,—a contingency which will be met in the distant future, by over-riding the 400 years' rule and specially counting "Leap Day" in the Year 4000 A.D.

Thus $\frac{3 \text{ days} \times 4000}{400}$ *+ 1 day (for 4000th Year) = 31 omitted "Leap-days" which divided into the 4000 year period averages the required 128 years per Leap-day omitted.*

The whole object of the great "Gregorian Reform of the Calendar" was to conveniently adjust the Almanac to the "Solar Year" by omitting this 1 Leap-day per 128 years *(in complete days),* as fractional day adjustments were impracticable.

Between Cæsar's Reform, 46 B.C., and Pope Gregory's Reform in 1582, had elapsed 1628 years, which divided by 128 years, show 13 "Fourth (Leap) Year Days" should have been omitted. Of these 3 days were adjusted by errors made after Julius Cæsar's assassination, leaving the 10 days which Pope Gregory omitted in 1582.

The foolish refusal of the English Authorities to reform the British Almanac until over 128 years later, in 1752, compelled our Rulers to then omit 11 days, whilst the Russian people have to leave out 12 days in their Calendar for this year 1900, because they are a little over 128 years later than we were in re-adjusting their Almanac to the Season's of the "Solar Year,"—consequently in 1899 the Russian traditional times for ploughing, sowing, etc., had reached the dangerous length of being 12 days out of Season.

The Egyptians actually allowed their 365 days' Calendar to drift right through the Seasons in the almost incredibly long period of 1461 years (*i.e.*, 365¼ in quarters = 1461), which they called the great "Sothic Period," as will be later explained, and it is just possible that the pyramid-keepers were not absolutely satisfied with their refining limit of the odd yearly day fraction and still aimed at closer results.

Far more probable is the idea that the Priests knew by the geometric ratios of "shadow rods" nearly as practically as we do by figures, the value of that cumulating fraction of a day each year, but it was their special interest to keep that knowledge as a mystic secret to enhance and maintain the power of the priestly class, who lived luxuriously upon the ecclesiastical estates worked by slave labour, and whose high duty it was at seasonable times during the true "Solar Year," to proclaim by Festivals, etc., the chief dates of the sacred Calendar for agricultural operations, etc., as ostensibly revealed to them by the all-pervading and life-giving "Sun-God." By that means the toiling peasantry were led to believe that the priesthood and Sun-God worship should be supported to ensure that the right Solar Seasons should be continuously revealed to the nation.

Meantime the fanatical conservatism of the common people caused them to cling to the 365 days' Calendar, until the dropping of the ¼-day caused the Seasons to gradually drift through every day of their fixed Calendar.

The public insertion of an extra day *every 4th Leap Year* would soon have divulged the treasured knowledge, which could thus have been traced by counting, whereas the self-interest of the priesthood led the priests to keep secret the length of the Year.

But for Governmental and Astronomical purposes the "Pyramid-keepers" noted the length of the Year as near as they could, by tracing the shortest Equinoxial shadows passing over the "4·45 ft. gauge," because they had to indicate to the people by priestly declarations the right times for Sowing, Irrigation, and other Seasonal work; and as the mystification of the people's ideas of the Calendar exalted the truer knowledge of the Rulers, and was a potent means towards maintaining the ascendency of the Priesthood over the toiling masses of the people, the priests had no inducement to disclose their secret to the people, but on the contrary, their power over the masses seemed dependent upon the maintenance of their great secret knowledge of the Years and Calendar events.

Those were exclusively noted by counting the days between the shortest of the mysterious pyramid shadows and noting the additional fraction of a day shown by the measure of that shadow upon the "4·45 ft. gauge," as already explained.

As a matter of fact the actual 1899 shadow on 20th March would not exactly disappear at noon, because the exact *Equinoxial* elevation was not attained by the Sun at that precise moment; but to simplify the subject for the general reader, I thought it best to base the diagrams and calculations upon that clearing assumption, and therefore on that basis have continued the computations, as the reasoning is thereby greatly simplified, and the results are quite near enough for practical purposes.

In the course of 128 years, a "Spring Equinox" would fall at the auspicious time when the Equinoxial elevation was reached at the pyramid's true meridian noon; but that was the crux of all pyramid research and had to be discovered under the inevitable and insurmountable limitation imposed by their only available pyramid style of building. If it was to be a perfect Sun reflector, the possibility of more than one-half the Equinoxial noon shadows being traced was precluded, as the almost equally needed noon shadows for March 21st could not fall behind the pyramid's North Slope which had to be fixed at the true Equinoxial-angle; therefore their only available evidence was practically "lop-sided," and their difficulties immeasurably greater than they are now conceivable to persons who do not patiently strive to reason them out.

Notwithstanding all these most confusing perplexities, the exact Equinoxial slope had to be traced and located; but as the incalculable task of building the pyramid took many years before that slope could be laid down, and the Egyptians could hardly tell exactly whether a given sized pyramid could be completed by a desired Equinox, there was always a risk of slope error, long after the errors of orientation had been overcome.

SHAPE OF THE PYRAMID.

Their crucial difficulty was to find the exact slope of the Sun's rays at mid-day of the Equinox, as upon that depended the solution of all their problems of astronomical research, which were directed towards solving the length of the Solar Year. When once that slope was found, they could proceed with the certain knowledge that their problems could then be solved. Since that required minute observation to be taken at the precise moment of the year, we can readily see it was a point of the utmost difficulty, as deviations from the true Equinoxial inclination of slope rendered the pyramid more imperfect the more they diverged.

The pyramid built to that slope, on whatever length of base, was bound to cut off at its apex just at the right vertical height, provided care was taken to ensure that its foundations were laid level, and that the courses of the superstructure were also kept level, as was so carefully done in the Great Pyramid.

Now, the square pyramid was conspicuously the ideal structure to ensure these requisite safeguards towards settling the great almanac question the designers had in view. Lack of space forbids detailed proofs of the defects of triangular or other polygon erections for such a purpose; suffice it to say that the cone is the only other model which could be used to appreciable advantage.

From the practical builder's point of view, the pyramid on a square base could be easily tested, as each course was built, by diagonal water levelling troughs, and could so be built level. It was far simpler, and therefore more preferable than the cone, which was very difficult to get true owing to the constantly curving rings of each course.

The most easily built pyramid, giving truer results, would lead to the choice of the pyramid form, which was also infinitely more useful in developing, by the study of its shadows, that trigonometrical knowledge so useful to the pyramid priests who controlled such large portions of fertile land, which they had to yearly re-measure and parcel out to the people after the inundations had swept their mud boundaries away.

Further, the clear-cut angles of the pyramid would be most useful for measurement purposes, as by "plumbing in" with a plumb-bob and string, the distantly discernible pyramid angles at the various permanent boundary stones, they could draw "true lines" during their annual surveys.

But these latter are altogether insignificant uses when compared with the great Year-finding purpose for which the pyramids were built.

Probably the yearly variations in the shortest shadow-range, when first noted in pyramid research, would lead observers to think their pyramid slope was slightly defective. At any rate, the key to their "Year Problem" depended upon the true slope and pointed erection being raised sufficiently high to cast shadows long enough to enable observers to distinguish the yearly differences in shadow-lengths at the Equinoxes.

Summer Solstice Slope.

Reverting to the Sun Elevation (Plate II. on page 38), the Sun's Cairo Elevation on June 21st being 83° would give a Summer Solstice shadow-slope of 7° from the perpendicular, which, translated into the black pyramid form **90. S.S.** under the crown of the large circle, was obviously too steep for the Egyptians to build to anything like the height required to differentiate the separation points between the Solar Years.

They could and did apply this Solstice slope to the Temples at Luxor, etc., in the same way as did the Temple-builders of Babylon, etc., but higher erections of that almost vertical slope were impracticable until much later ages, when scaffolding, pulleys, and other appliances became available. They therefore had to fall back upon the much less sloping style, more adapted to utilizing their long sloping sand-mounds, which they raised as the building courses were added. Up these they could roll the heavy blocks of material to the required heights when building the more feasible Equinoxial-shaped erection 90. E.E., as outlined by the Sun's rays in G.P., at the foot of page 38.

Winter Solstice Slope.

The large diagram from which Plate II. (page 38) was taken proved that the Winter Solstice (W) angle would not admit of the requisite height being attained, besides which a pyramid of that shape would not only have prohibited the possibility of registering any of the essential mid-day shadows, but also have made the fixing of meridian-noon "by sighting" very difficult at any other time than near the Winter Solstice.

On the other hand we have already seen that the Summer Solstice Slope (S) was too steep for men to build to the required height.

Therefore it was inevitable that the Equinoxial Slope E should be ultimately adopted as the central point of research.

There was another essential and conclusive reason why the Equinoxial Slope E must imperatively have been resorted to. That was, the inter-day speed of shadow change was about 180 times more clearly marked at the Equinoxes than at the Solstices, despite the fact that the Winter shadows seemed so long.

Professor Smyth, the late Astronomer Royal for Scotland, who spent a great part of his energies upon studying the Great Pyramid problem in Egypt, etc., was such an able and conscientious observer that his printed authority for stating that the Great Pyramid is π shaped by the Sun's Equinoxial Angle Slope cannot be disputed, since that has been approximately confirmed by all subsequent scientific investigators of repute.

It is remarkable that none of those seekers after truth, so far as I can trace, hit upon the real purpose of the Pyramid as a "shadow observatory" to find the length of the Year, even when the key to the problem was thus laid bare in the significant pyramid slope.

Unfortunately, that wonderful and surprising Slope, with other evidence, was taken by Professor Smyth as proof that supernatural knowledge had been displayed by God to the pyramid designers for Biblical purposes, to aid His chosen people the Israelites; and in the resulting conflict which arose between Biblical scholars and scientific men, the true cause for which the Great Pyramid was built seems to have been lost sight of.

From the proofs I have already adduced, we can hardly doubt the fact that the slope was acquired by long pyramid experiments, for shadow tests of the Sun's movements.

I cannot at all accept Professor Smyth's supernatural theory, because, as I shall later show, all the wonderful pyramid data are plainly explainable by the pyramid shadow-method men had of necessity to employ in tracing the Sun's course.

There is nothing at all supernatural about it. Both its size and shape were derived by the Egyptians following nature's simplest indications as displayed by shadows.

The *vital point* which Professor Smyth's zealous efforts has made clear is that the original northern slope of the Great Pyramid exactly consumes its own mid-day shadow at the Equinox (as illustrated on page 64), though the significance of that fact seems to have been entirely overlooked.

There does not appear to be anything to show that the great men who have hitherto sought to solve the pyramid problem have studied pyramid shadows, yet the above fact proves the crux of my theory that the Great Pyramid was erected to measure the lengths of the Seasons and the Year, *because its sloping sides, bounded by the directing "arris-lines" converging at the apex, point unmistakably to the only central point of the Sun's apparent yearly course, which could best gauge Solar movements by perfectly reliable daily shadows from the pyramid's outline, on a large enough scale.*

was thus determined by the angle of the Sun's Equinoxial Mid-day Elevation, which was the ruling factor. That essential angle would be most difficult to gauge for such a huge work, when, owing to those complex time variations of time we call "Equations of Time, etc." (which they could hardly have fully understood), the guiding mid-day shadow fell on the one Equinox over 7 minutes BEFORE "*mean-time*," whilst on the next it would be about 7 minutes AFTER "*mean-time*," at either of which times (as already explained) the lowered position of the Sun would reduce the angle from the true mid-day elevation slope they required.

Further, I have already shown that the Equinoxial Noon-Slope varied from year to year, and only repeated the identical noon-slope about once each 128 years, which term being beyond the vigorous life of any man, precluded the possibility of any observer again verifying the *true Equinoxial slope* of the Sun's rays which passed as a momentary flash of light.—Moreover, the fierce sun-light prevented direct sighting of the transit, so that men could only indirectly test the slope by testing the sweep of the Pyramid's shadow at *Equinoxial meridian noon.*

The Cairo mid-day Elevation of the Sun at the Equinoxes indicated that peculiar slope required to shape the perfect π pyramid and furnish its characteristic

"ARRIS-LINE RIDGES,"

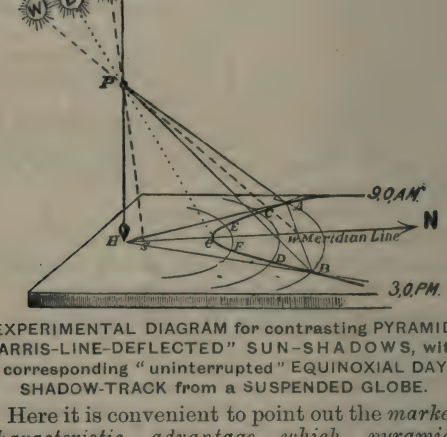
which we may define as the angular ridges along the joints uniting the slopes from the four corners of the base to the apex.

The slope of the pyramid was the prime means towards fixing the "arris-ridges" true. Any error in the slope would be increased in the "arris-ridges," and further magnify the error in the "arris-lines" bounding the Sun-shadow cast from the ridges. From this, we may see that, whilst the Equinoxial slope was of the highest importance, these "arris-ridges" governed the reflecting lines of shadows from the whole structure, and were most vital factors in pyramid research. Upon their accuracy very largely depended the measure of success derivable from these massive buildings, and the subsequent long series of patient experiments for which they were intended to serve as reflecting instruments to tell the time of the Year, etc., by the length and direction of the pyramid Sun-shadows cast from those ridges and bounded by their "arris-lines."

The four "arris-ridges," *so carefully fixed to the corner compass points, N.E., S.E., S.W., and N.W.*, were primarily designed as a quadruple "gnomon," or "style," for the HUGE SUN-DIAL—WHICH THE PYRAMID REALLY WAS.

The Sun's daily transit times would be registered by the triangular shadows cast from these "arris-ridges" in pairs, from which we may name the ever-varying sides of the shadow-grams as they daily developed; whilst the base-lengths of such triangles were always fixed by the known length of the floor-level distances between each pair, which were successively brought into duplicate use each day, thus:—At Sunrise, S.E. and N.W.; forenoon, S.W. and N.W.; mid-day, N.W. and N.E.; afternoon, N.E. and S.E.; Sunset, N.E. and S.W.

The mid-day N.W. and N.E. shadows could only be cast from a π pyramid near Cairo during the six Winter months, when the N.W. and N.E. "arris-ridges" would both be brought into play thrice daily, but during the Summer each ridge would only cast its "arris-line" shadow during morning and evening of each day.



EXPERIMENTAL DIAGRAM for contrasting PYRAMID "ARRIS-LINE-DEFLECTED" SUN-SHADOWS, with a corresponding "uninterrupted" EQUINOXIAL DAY'S SHADOW-TRACK from a SUSPENDED GLOBE.

Here it is convenient to point out the *marked characteristic advantage which pyramid-shadows possessed, over all other forms of shadows* cast from other shaped erections, by the tilting effect of the "arris-ridges" raised from each corner of the pyramid to its apex. They cause the resulting noon shadows between the Autumnal and Vernal Equinoxes to graduate up and down the "meridian-line" in a series of *isosceles triangles*, gradually extending (like the diagram on page 76) from the plain straight line of the pyramid's Northern base, by degrees so small as to be hardly differentiated from the base-line at first, but daily expanding, with the shadow's apex always falling upon the meridian-line at meridian noon, until at the Winter Solstice the shadows extend to 268 ft., after which they gradually contract until at the Vernal Equinox the Sun at noon shines sheer down the slope and dispels all mid-day shadows from the Vernal to the Autumnal Equinox.

The complete range of morning and afternoon shadows thus cast from these ridges of the π shaped pyramid have already been

proved to be almost continuously united along their Northern edge in *straight lines* along each wing, as per diagram C on pages 53, 55, and 57.

To contrast the effect of those *straight-line continuous shadows* as deflected by π pyramid "arris-ridges," with shadows cast from the like height . *but without* "*arris-ridges*" *intervening*, the opposite diagram of a simple experiment, easily tested at home, may be helpful.

Directly over the Great Pyramid's centre, **Z** represents the Zenith from which a rope descends to the pyramid's base-centre, where it is held tight by the plummet *H*. At the point *P*, *corresponding to the height of the pyramid's apex*, is knotted a globe *sufficiently large to ensure that its shadow shall not vanish before reaching the ground*.—Then the Sun shining upon that globe throughout the Equinoxial Day, would cast a continuous shadow equivalent to that which the apex of the pyramid would have thrown upon the "North shadow-floor," *supposing that no* "*arris-ridges*" *intervened*.

By following the globe's shadow, say from 9-0 a.m. to 3-0 p.m. as it moves along the floor, we may notice that it traverses the hyperbolic-curved-line *A C E* towards the "meridian-line" which it cuts short at *e* marking noon, just at the foot of the pyramid's Equinoxial slope, indicated by the dotted line from the Equinoxial Sun **E**. Thence the afternoon shadow-line extends the hyperbolic curve through *F D B*.

A.P. indicates a North-West "arris-ridge," and B.P. the North-East one.

The triangular slope A.P.B. would then indicate the Northern Slope of a Winter Solstice Pyramid—and the distance from *e* to *w* on the Meridian Line would show the full 268 ft. range of shadows-tips, or length of "shadow-floor," required to register all noon shadows between the Autumn and Spring Equinoxes for the Great Pyramid's height at 30° Lat.

The almost vertical "hit and miss" line S s shows the slope which would be needed for a Summer Solstice Pyramid to register noon shadows throughout the year.

The curves A B, C D, E F represent the outlines of a series of cone bases, to show how much more difficult their Equinoxial slope would be to build and register their constant isosceles shadows.

The contrast between the hyperbolic curve A, C, E, F, D, B, and the actual straight-line direction of the united shadow outlines in series C, on pages 53, 55, and 57, as deflected by the "arris-ridges" of the π pyramid, are so clear that the distinguishing advantages of pyramid shadows will be apparent in the light of the prior explanations given.

THE HUGE SIZE OF THE GREAT PYRAMID next commands our attention.—Shortly stated my conclusion is that its enormous size was entirely due to the two essentials of height and slope, which were imperative in the Pyramid method of Year-finding research.

The great 484 ft. height from which the Pyramid designers had to deflect such large Sun-shadows upon the "4·45 ft. gauge" to differentiate the yearly fraction of a day beyond the 365 days, had to be attained at all costs.

Then as the Equinoxial Slope was equally necessary, the Pyramid had to be spread from that 484 ft. apex height, by sloping sides governed by the Sun's Equinoxial noon-rays fixing the Slope to the ground level; thus the huge masonry pile was permanently built over the vast area of 13⅓ acres into the stupendous Great Pyramid, which for over 5,000 years has been, and still is, the wonder of the world.

Our wonder grows beyond mental grasp, when we remember that the Great Pyramid is but one in a series of about seventy pyramids, constructed for this great year-finding object.

Consider, for a moment, the vast mass of the Great Pyramid alone, which required over 6,000,000 tons of stone to be brought from immense distances. The figures do not look much, as it is quite impossible to mentally gauge such an enormous quantity without actually seeing the pyramid; yet it may be a help in that direction to state that my estimate of the quantity of stone used in the building of the 14,000 or 15,000 churches and cathedrals of England since Christianity was introduced, just about equals the bulk of the pyramid; *i.e.*, during nearly 2,000 years, the richest and most powerful nation in the world has through all the enthusiasm of the Crusades, centuries of ministerial and congregational labour, bequests from the dying, and vast accumulation of property from the early Christian Churches, only raised and dedicated to the glory of the noblest life ever lived, about as much as the ancient Egyptians are represented as having spent over the remains of a single early ruler.—Such an idea is preposterous, and must be abandoned.

Reasoning people require to have a much more adequate reason for the greatest building ever completed by men. Such reason, it is suggested, existed in the imperative national requirement of a complete system of Time based on the Year of Nature, and of a true Calendar based upon the Seasons of the Year.

From practical experience, the Egyptians knew they could not build perfectly vertical an erection sufficiently high to define mid-day shadows to note the days throughout the year. The GREAT HEIGHT REQUIRED, and ABSOLUTE VERTICALITY SO ESSENTIAL to accurately differentiate all the days, were beyond their powers, because the 83° Elevation of the Sun at the Summer Solstice would only leave 7° from the perpendicular for their supporting slope, to allow of the Summer mid-day shadows "falling in" to be recorded to their vanishing point on the shadow-floor's edge along the pyramid's North base-line.

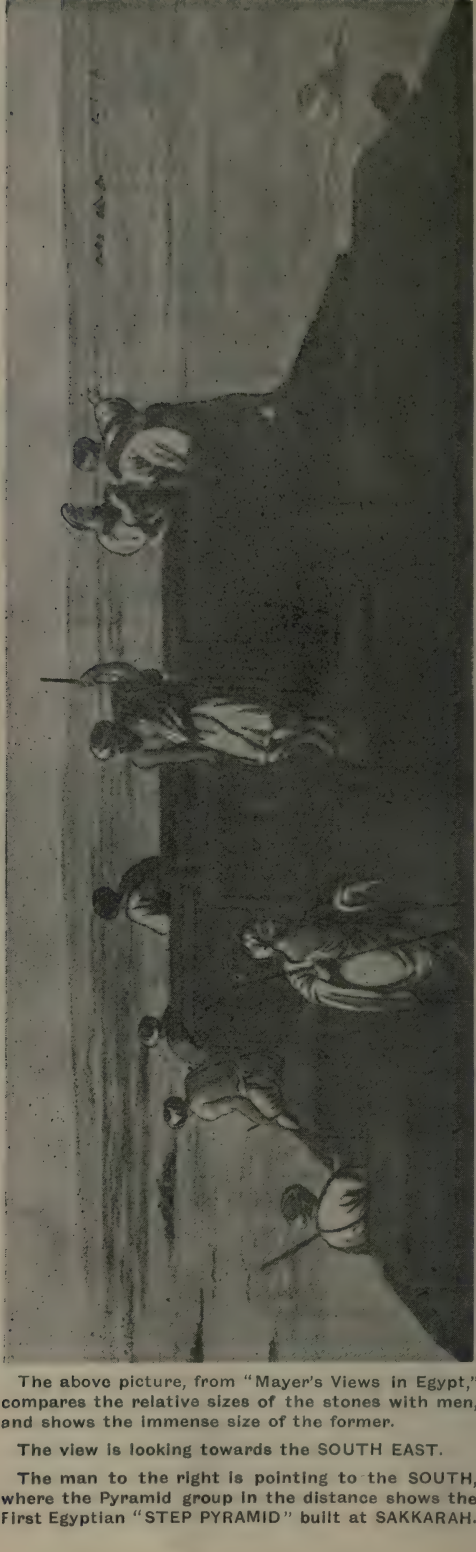
Such a slope would have given the erection either a wedge-like or obelisk shape, whilst the immense height needed to ensure accuracy would have necessitated the use of such high scaffolding, etc., as it was then impossible to procure, and which would even now tax the combined efforts of the world's greatest builders of "sky-scrapers" at Chicago and elsewhere.

The pyramid-builders, despite all their determination and abundance of labour, had to abandon the idea of such a task. They accordingly resorted to the next best possible course of taking the central or Equinoxial slope of the Sun's mid-day rays as their surest guide, by the daily shadows such a pyramid would give during the Winter half of the Year. Thus at first they could not trace the whole year, so had to be content to take half-years. They did not know the year's length, and therefore could not have discerned that subsequently found difference between the lengths of the two half-years, which so greatly perplexed them and retarded their solution of the year.

Reflection will convince the reader that FIXED DATES counting of days between the Equinoxes, and then close observation of pyramid shadows were essential to find the Year's length, which could not be reliably traced from the SEASONAL INDICATIONS.

How could men determine the length of the year by their crude ideas of the erratic Seasonal weather? Take this year (1900) as an example. All North Europe was covered with snow on March 19th, *within a day of the Equinox*, whilst two days after (March 22nd) we had colder weather in Great Britain than was experienced at the Mid-Winter Solstice.

Egyptian estimates of the recurring seasons would continue to vary until definitely "fixed dates" were established from which the days could be counted, and so long as such men did not know the year's length, so long would those supposed fixed dates be still fluctuating through the year, even whilst the searchers might be under the impression that their selected dates were really fixed.



PYRAMID STONE-BLOCKS compared with MEN for SIZE on the TOP of the GREAT PYRAMID.

The above picture, from "Mayer's Views in Egypt," compares the relative sizes of the stones with men, and shows the immense size of the former.

The view is looking towards the SOUTH EAST.

The man to the right is pointing to the SOUTH, where the Pyramid group in the distance shows the First Egyptian "STEP PYRAMID" built at SAKKARAH.

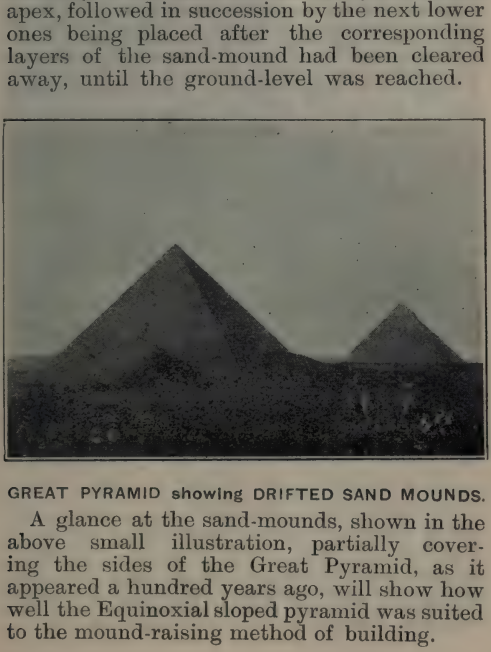
HOW THE PYRAMIDS WERE BUILT.

The great practical building advantage derived by the adoption of the Equinoxial slope was that it was so admirably adapted to Egyptian methods of building up to great heights. High scaffolding, cranes, pulleys, etc., being then unknown, they had to use the extremely slow and laborious means of raising immense "inclined planes" and piling working platforms of huge sand-mounds along their pyramid sides whilst building. These were gradually increased in height as each successive course of the pyramid core rising higher, compelled them to add another large layer of sand to the necessarily long and very gradually sloping mound up which the huge pyramid stones weighing about 2½ tons each, had to be hauled on rollers with the aid of lever-poles by other groups of slaves, straining every nerve in the arduous task of rolling and sliding the stones up these increasing slopes.

The size (about 35 c. ft.) of these huge blocks may be judged from the illustration opposite.

We can hardly imagine the stupendous labours involved in that task, when the chief means of attaining those heights was to force the myriads of slaves to carry up the sand in bags or baskets, and empty it at the required mound-heights, as the building advanced.

The illustration of the "Casing Stones" (page 66) still capping the Second Pyramid shows these stone layers, whilst the overhanging sheathing proves that the outside casing began at the apex, which was a massive stone most carefully pyramid-shaped and polished, as befitted the crowning point, or "headstone in the corner," of men's mightiest building. Then came the casing layer next the apex, followed in succession by the next lower ones being placed after the corresponding layers of the sand-mound had been cleared away, until the ground-level was reached.



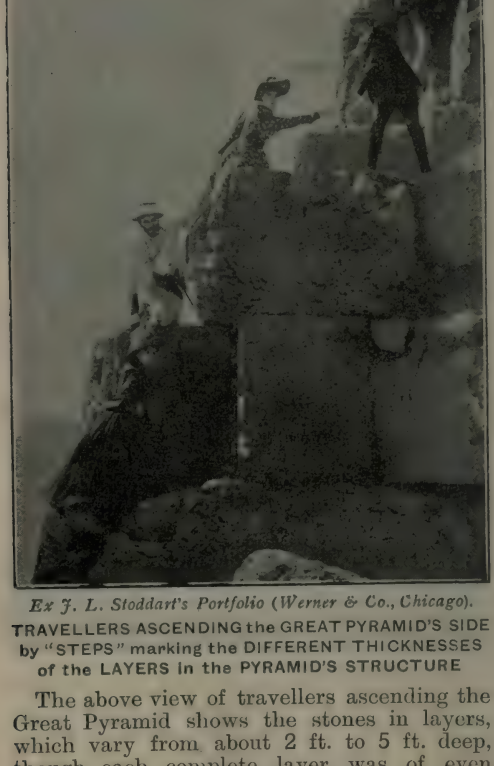
GREAT PYRAMID showing DRIFTED SAND MOUNDS.

A glance at the sand-mounds, shown in the above small illustration, partially covering the sides of the Great Pyramid, as it appeared a hundred years ago, will show how well the Equinoxial sloped pyramid was suited to the mound-raising method of building.

The granite stone blocks were quarried some 400 miles up the Nile, down which they were boated to the specially prepared canal and wharves near the Pyramid's site. From those wharves vast and marvellous "causeways" or roads of the most durable kind ever constructed by men led up the "Sand-incline" to the Pyramid building. Upon these roadways the stone was rolled on rollers by multitudes of slaves, using ropes and "levers," whilst up the steeper mound, wooden tramways, or "skids," greased for sliding the stone-blocks more easily, were available.

We know from very ancient Egyptian pictures that long poles were used as "levers," with blocks and planks up and along which the stones could be rolled and dragged up the sand-mounds, to the appointed position in each particular layer.

Without such means it would have been almost impossible to raise such heavy stones so high, and pile them in the square layers or steps which formed the solid bulk of the pyramid, thus built in tiers before the outer casing stones were added.



Ex J. L. Stoddart's Portfolio (Werner & Co., Chicago).

TRAVELLERS ASCENDING the GREAT PYRAMID'S SIDE by "STEPS" marking the DIFFERENT THICKNESSES of the LAYERS in the PYRAMID'S STRUCTURE

The above view of travellers ascending the Great Pyramid shows the stones in layers, which vary from about 2 ft. to 5 ft. deep, though each complete layer was of even thickness and levelled, probably by water troughs during the building operations.

Evidently the natural stone had varied in thickness as layered in the quarry, and so could not all be wrought into blocks of even thickness without sheer waste of labour, which the designers avoided, seeing that equal layers were not essential.–The only imperative requirements were sufficient height of solid building, sloped to the Sun's Equinoxial rays.

By persistent efforts the prior pyramid builders had zealously striven to catch the Equinoxial angle of the Sun's rays, but they could not get accuracy owing to being unable to combat the following (amongst other) difficulties:—

(*a*) The difference between the number of days in the two half-years separating the Equinoxes;—
March to September 187 days, whereas September to March is only 178—**a difference of 9 days;**
Again, from the Summer Solstice to Winter Solstice is 184 days, whilst from the Winter Solstice to the Summer Solstice is only 181 days——**a difference of 3 days;**

(*b*) The perplexing variations in what we call the "Equation of Time" shadows;

(*c*) Their lack of knowledge of the 365¼ days' year, with consequent failure to adjust their years on "leap-day" principles, etc.

(*d*) The inexplicable drifting of the Equinoxial shadows through the accumulating ·24219 day fraction beyond the ordinary 365 days' year, causing the shadows to count an extra day between the fourth Equinoxes when Leap-year passed, **as the terminal shadows accumulated an extra day (which we now add as February 29th each Leap Year), so causing what otherwise would have been March 21st shadow, to leap back a day's step to near the former March 20th gauge in Leap Years—hence their name.**

During the earliest centuries the Egyptians would be unable within a day or two to fix the Equinoxial days marking the year-end, whilst the Time-Equation of the mid-day shadows would (as per Table of "Natural Gauges for the Sun") throw them about seven minutes wrong, in both of which cases their estimate of the angular slope was sure to be wrong, and with that their pyramids must each, more or less, partially fail to reach perfection. Hence it is that so many of these defective huge pyramids exist.

They each in turn served as the best means available for a time; but when they were found to be inaccurate, the people of their day had to find out better shapes. The entire trend of inherited Egyptian thought kept them to the idea that the right pyramid shape could be found to finally locate the Sun's movements.

HOW THE PYRAMIDS CAME TO BE USED AS TOMBS.

Their previous increasingly successful attempts spurred them on to build a better pyramid, which, when completed, supplanted its predecessor. There being no further use for the old ones, interest in them would gradually decline, until the priests, after the lapse of many years, would, at the instance of some great Pharaoh, the more willingly renounce their authority over it, as thereby they would be relieved of the expense of its upkeep and care over it, whilst at the same time currying favour with their ruler. Thus the rulers, who were so anxious to find Tombs secured against all possible intrusion, turned towards the obsolete pyramids, which combined ideal security with that ostentatious funereal display which appealed so strongly to Egyptian minds. Their religious belief, typified in the careful preservation of their dead, led them to seek and utilize these most inviolable Sepulchres as an ideal personal advantage.

When obsolete pyramids were not available, smaller imitation pyramids were specially built as Tombs for the great ruling princes or prominent members of their families.

Possibly also some eminent Pyramid-keeper and designer, as the Egyptian Astronomer Royal may, considering the power of the priesthood, have been entombed *in a recently disused pyramid*, just as Sir Christopher Wren, the designer of St. Paul's (London) was buried in that Cathedral designed by him.

The generally accepted idea that the great pyramids were purposely erected as Tombs is altogether too preposterous for enlightened persons to think possible.

That most of them have been subsequently used as sepulchres must be admitted; but, whilst during later centuries that possibly gave rise to the assumption that they were erected for that purpose, I submit that their utilization as Tombs was a mere later and secondary use of these erections, which embodied the far grander objective use of solving the Seasons of the Year, to thereby ensure the national prosperity and happiness of the people.

The question will be asked: What evidence can be adduced to show that they were appropriated as Tombs in later years?

To answer that we may point to the Tomb passages of the earliest pyramid at Sakkarah, which are architecturally proved to have been made at a *much later* date. Again, the 3rd Pyramid of Gizeh was appropriated by an Egyptian Queen over 500 years after it was completed, whilst Professor Smyth has demonstrated that Cheops, the reputed builder of the Great Pyramid, was not buried in it as a Tomb, but that Cheops was laid in the great rock Tomb to the South-East of the pyramids—*hence the Great Pyramid was never erected as a Tomb.*

The very anxiety of the Monarchs to secure safe sepulchres tends to prove that they realized the danger of later generations usurping the already occupied Tombs.

The ready way in which Tombs have been entered, despoiled, and re-used throughout Egyptian History, and even in our own time, repeatedly shows how prone men were to do so.—We need only instance Caliph Mamoun's breaking into the Great Pyramid, and the well-known fact that nearly all the known Tombs have been broken into long ago, whilst Tombs of early date have frequently been found to contain bodies evidently belonging to a much later period.

The earliest Egyptian History was written by Mantheo at far too late a date to be reliable in pyramid dates which were so long anterior to written history.

From the above independently proven facts of history, it is unmistakeably clear that even the dates of the entombment of such exceptional mummies as have been found in pyramids, form no criterion of the dates when those pyramids were constructed.—On the contrary, the evidence almost always indicates that the pyramids are much older than bodies found therein.

The Egyptians of all people in the World's History were the most given to worshipping or caring for their dead, and therefore they were the most liable to subsequently name a disused year-finding pyramid after the name of the Ruler or High Priest buried therein, after the pyramid later became used as a tomb.

WHY THE LATER EGYPTIAN PEASANTRY OSTRACIZED AND HELD THE PYRAMIDS IN CONTEMPT.

All later tradition points to the pyramids as being regarded in a spirit of odium and detestation by the labouring population. That may reasonably have arisen from hard memories of slavish toil endured under those oppressive times during which the pyramids were built by forced labourers, who were kept in ignorance of the great and useful objects for which their unexampled labours were intended. Probably those uneducated toilers concluded that such erections were useless, or intended solely to keep down the masses of the people in slavery for the selfish benefit of the privileged classes, hence they would be driven to entertain the resentful feeling of detestation towards the pyramids and their unfeeling priestly directors, which was evinced by the Israelites and led to their Exodus.

Egyptian pyramid slaves mutinied on several occasions, throwing and rolling down the pyramid stones upon their task-masters. Evidence of this revengeful wrecking spirit may still be found in the tumbled state of some of the smaller stone pyramids (as shown by the small pyramids to the left of the Gizeh pyramid plate on page 68), and the fact that large statues were broken and thrown down wells, etc.——That, to my mind, explains

WHY SUCH LARGE STONES (2½ TONS EACH) WERE USED TO BUILD THE GREAT PYRAMID

as seen by comparing the blocks of stone with the size of the men on page 92, showing the top of the pyramid; the REASON BEING to PREVENT THE MUTINOUS USE of such blocks BY MAKING THEM TOO HEAVY to thus hurl down upon their oppressors. The extra weight caused additional punishment to the recalcitrant slaves, whilst it secured that great stability and durability so essential to defy the ravages of time and turmoil in the stupendous work by which they meant to ascertain the TRUE TIME LENGTH OF THE SOLAR YEAR, as well as the hours of the day, during all future time.

HOW THE ORIGINAL PURPOSE AND USES OF THE PYRAMIDS WOULD SUBSEQUENTLY BE BURIED IN ANTIQUITY.

Assuming that my contention is correct as to the pyramids having been primarily built to ascertain the length of the year by the systematic record of their shadows, it follows that when once that knowledge was attained by the last and most perfect "Great Pyramid," the chief use of the pyramids would be absolutely ended by the establishment from their data of a more easily reckoned, fixed Calendar, which only required 365 day counters (subdivided into seasonal periods then also first made sure), and the Leap-Year adjustment for the fraction of a day accumulating each year.

Moreover, as the Great Pyramid was sealed up, without apparent entrance or interior spaces, we may fairly assume that its entrance was built up, either after all its remarkable uses were completed and recorded in its Chambers and Galleries, or more probably through fear of the Arabian (most likely), Greek, or Roman invasions which followed, as the priests would seek to shut out such foreign races from the privileged knowledge of the Egyptian priesthood.

In addition to those factors, the sullen, resentful spirit of the myriads of former pyramid building slaves would entail a desire in their descendants to forget all the unhappy memories involved in the cruel slave-driven labours of the long series of pyramid erections, during so many generations, as must have borne down the harassed ignorant slaves with the idea that pyramid building was their rulers' perpetual and senseless craze. The great incentive would then be to forget the cause of their toil, to secure peace of mind as their only solace.

Thus all connected with the pyramids would trend, as years advanced, to bury all thoughts respecting them in oblivion, and merely leave the inexorable pyramid forms to raise wonder in the minds of all following generations.

PROPERTIES of the PYE (π) PYRAMID developed and utilized for EDUCATIONAL, etc., PURPOSES.

The secondary pyramid uses in the embryo development of Astronomy, Geometry, etc., would be quite insignificant when compared with the great factor of the year problem they had just solved, although the success thus gained would stimulate the priestly educationalists to truer and keener mental efforts so long as the ascendancy of the priestly class was maintained; but as in later centuries their influence inevitably waned under the growth of the people's power, even those secondary uses would gradually disappear, until in the last resort the proud, exclusive remnant of the priestly race would carry their secrets to be buried with them in the grave.

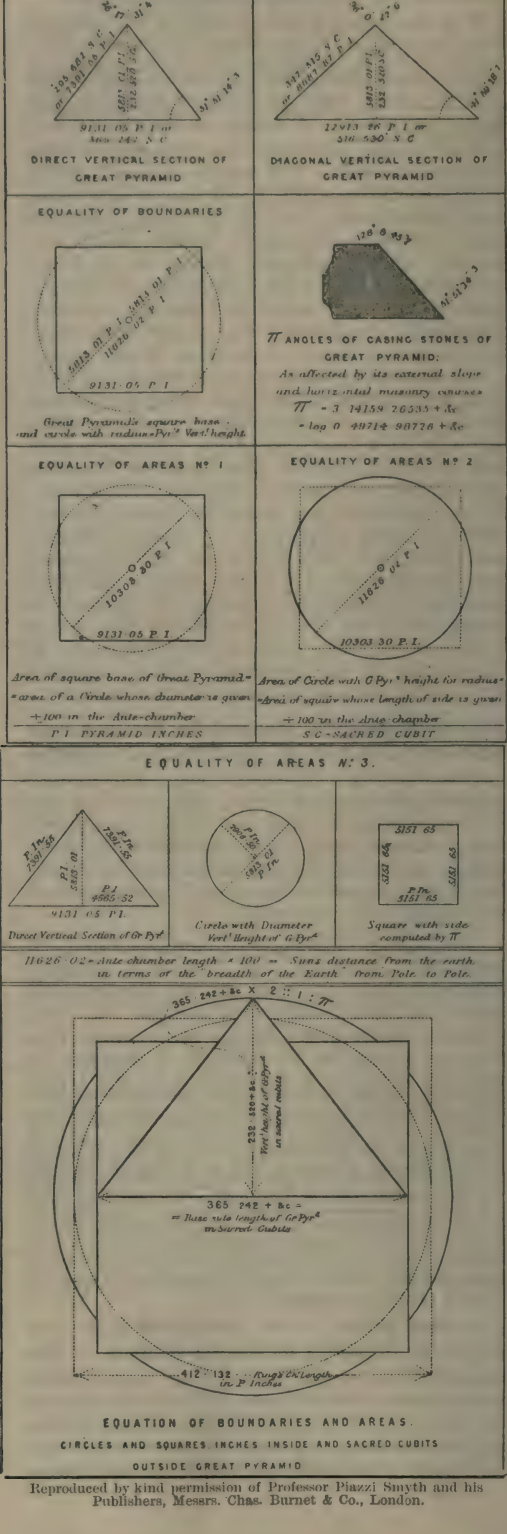
We know, from the earliest Greek records, that such exclusive, secretive spirit dominated the Egyptians, especially their priests, far more strongly than even that of the Chinese priests and mandarins when the ships of Western civilization first reached the shores of China. Greek merchants and travellers had to resort, through many generations, to tedious schemes and devices to worm out of the Egyptian priesthood such bits of knowledge as they could by friendship and bribery be induced to divulge! That may account for the scant credit the Greeks gave to the Egyptians as originators of the information thus acquired for extending use throughout the world.

All the Wonderful Geometric Factors and Numerical Ratios of the Pyramid's Shape as discovered by Professor Piazzi Smyth, and reproduced over-leaf from his book on the "Great Pyramid," by his kind permission, have hitherto been taken as evidencing a far higher astronomical and mathematical knowledge on the part of the early Egyptians than the facts really warrant.

The early Egyptians, being limited to geometric methods of research mainly deducible from shadows, finding the pyramid to be the instrument most suitable for their purpose, developed the gradually improving series of pyramids, as outlined in sections on page 24, until they culminated in the Great Pyramid being placed in that peculiar position to which is attributable all those marked characteristic ratios of the π Pyramid, nearly all of which result from the π ratio of the diameter of a circle to its circumference. That crucial fact of mathematics was most probably thought and worked out for humanity's benefit at the Great Pyramid.

It was bound to be discovered by the evolution of men's reasoning powers in the course of ages, and when thus opportunely made known, was sure to lead to the further development of men's inventive and enquiring minds, resulting in the other data and ratios which are graphically shown on the next page.

Geometric Factors and Numerical Ratios developed in the Great π Pyramid near Cairo.


9131 05 P I m
Acs 142 S C
DIRECT VERTICAL SECTION OF GREAT PYRAMID
12913 86 P I m
516 530 S C
DIAGONAL VERTICAL SECTION OF GREAT PYRAMID
EQUALITY OF BOUNDARIES
9131 05 P I
Great Pyramids square base and circle with radius=Pyr.d Vert.l height
π ANGLES OF CASING STONES OF GREAT PYRAMID:
As affected by its external slope and horizontal masonry courses
π = 3 14159 26535 + &c
- log 0 49714 98726 + &c
EQUALITY OF AREAS Nº 1
9131 05 P I
Area of square base of Great Pyramid = area of a Circle whose diameter is given + 100 in the Ante-chamber
P I PYRAMID INCHES
EQUALITY OF AREAS Nº 2
10303 30 P I
Area of Circle with G Pyr.d height for radius = Area of square whose length of side is given + 100 in the Ante chamber
S C = SACRED CUBIT
EQUALITY OF AREAS Nº 3.
9131 05 P I.
Direct Vertical Section of Gr Pyr.d
Circle with Diameter Vert.l height of G Pyr.d
Square with side computed by π
11626 02 = Ante chamber length × 100 = Suns distance from the earth in terms of the breadth of the Earth from Pole to Pole.
365 242 + &c = Base side length of Gr Pyr.d in Sacred Cubits
412 132 = Kings Ch. Length in P Inches
EQUATION OF BOUNDARIES AND AREAS.
CIRCLES AND SQUARES INCHES INSIDE AND SACRED CUBITS
OUTSIDE GREAT PYRAMID

Reproduced by kind permission of Professor Piazzi Smyth and his Publishers, Messrs. Chas. Burnet & Co., London.

π RATIO MEASURES of the GREAT PYRAMID.

These geometric figures, being drawn to scale, demonstrate to mathematical minds the proportional π ratios embodied in the Great Pyramid, whilst their recorded dimensions and descriptions will establish the all-pervading π pyramid factor to interested readers.

All the remarkable data disclosed therein appear to me as being due to the relative sizes and inclinations of the Sun and Earth, when separated by the Equinoxial Sun distance, when the Sun is viewed at 30° from the Earth's Equator.

Upon those factors all seem to hinge, when we consider the Almanac-finding object of the Pyramid, for at 30° the π shape must always be developed from every conceivable size of square-based Pyramid used, because the Equinoxial Slope must inevitably be there applied for Solar Pyramid research, and cannot result in any other shape if that slope is accurate.

Despite all their prior series of pyramid efforts, the Egyptians yet failed to quite find that *true position* which, based upon the Sun's Equinoxial Angle, would alone develop the perfect "π shaped pyramid" *as the Sun measuring instrument* with the following essential ratio measures or properties demonstrated opposite:—

1. The *vertical pyramid height*, applied as *radius* to describe a circle, produces a circumference exactly equal in length to the sum of the four square base lines, *i.e., it solves the celebrated quadrature or "squaring of the circle" problem.*
2. The area of the vertical central section (parallel to the base lines) is to the area of the base as 1 is to 3·14159 (π).
3. The vertical height is to the sum of any two sides of the base as the diameter is to the circumference of the circle, *i.e.*, as 1 : 3·14159, *which latter number is herein called "π" (pye).*

This π ratio is the great geometric factor from which arose all these and other remarkable proportions of the Great Pyramid as developed in its significant position near Cairo.

That *position* could only be found on the 30th Parallel of Latitude, as mathematical experts will see at a glance by referring to my illustration of "Pyramid Monthly Shadows" on page 60, across the top of which the Sun is shown at the Equinox as shining vertical at the Equator, and casting an angular ray shaping the true π pyramid in 30° N. Latitude, whereas the Great Pyramid's Latitude is 29° 58′ 51″.

But it will be urged that Mr. Flinders Petrie and the late astronomer, Mr. R. A. Procter, have proved that Professor Smyth's derived perfect mathematical ratio measures are not so exactly borne out by the actual pyramid dimensions. Granted; but whilst that is so, my reply is that the obvious reason why those

are not perfect in this final pyramid effort is, that the erectors had not prior to its construction sufficiently refined means to fix upon the true position, which was about one and one-third miles further North. It is really very wonderful that in those early times they were able by the sun's rays to gauge the angular distance of about two thousand miles from the Equator to within about one mile (*i.e.*, $\frac{1}{2000}$th) at the 30th parallel. Thus they got very near to absolute accuracy, but the slight difference, due to the defective means of observation, accounts for the divergence between Professor Smyth's ideal pyramid and the actual measures as verified by Messrs. Petrie and Procter.

From what has been already proved, we may reasonably conclude that the π ratio of 3·14159 was not known to the Egyptians as such a refined number. They would know by geometry that the circumference of a circle was rather longer than three times the diameter, but probably they did not know so near as even $3\frac{1}{7}$th times.

It was not in any sense needful that the pyramid builders should know the π ratio as a number, for I submit that it is conclusively proved in the preceding pages, that the π pyramid ratio simply results from the imperative adoption of the Sun's Equinoxial Angle, as the shaping factor in the pyramid method of Sun research, as directed by the straight-line shadow indications demonstrated on pages 53, 55, and 57, which led the pyramid builders, in their efforts to build the ideal pyramid, to the 30° Latitude Position, where alone the true π pyramid could be developed.

That straight-line deflection of the Equinoxial pyramid shadows' united northern edges, whilst it directed them towards the perfect year-finding pyramid, was simply caused by the then relative direction of the Sun's rays falling upon the spherical earth at 30° North Latitude, as the π or circle ratio shape of the Equinoxial Pyramid, depends upon the earth's annual cycle round the Sun being gauged in the one position at the Equinoxes.

That critical pyramid position would appear to the Egyptian observers as the central point for viewing the Sun's annual motion, and as the Equinoxial Slope clearly marked the mid-section of the meridian arc or fan of the Sun's Elevations, they would naturally conclude that the π shaped Equinoxial Pyramid was the most obvious means which they could devise, for finding the length in days of that annual cycle of Time which we call the length of the Year.

365¼ DAYS' YEAR measured in "PYRAMID UNITS" ROUND the BASE of the GREAT PYRAMID.

The next important proof taken from Professor Smyth's work is, that the base-lines of the foundation layer of the Great Pyramid, each measure in length nearly one cubit for each day in the year, *i.e.*, the sides of the base are all *about* 365 cubits long.

What more definite proof of the year-searching purpose of the pyramids could we hope to find than this foundational fact, so typically impressed upon every side of its outline in the figurative growth of the year from its starting point (apex) to its complete length in the base, or, *vice versa*, the decreasing remainder of days in the passing year as represented by the decreasing width of the slope's ascent from base to apex?

This fact proclaims the purpose of, and further explains the SIZE OF THE PYRAMID, because the cubit being their standard measure, they naturally (considering its year-finding object, and knowing their erection must be on an exceedingly large scale) determined that the square base of the final pyramid should be planned to the scale of one cubit for each day of the year, as near as they knew its length.

Unfortunately, the casing-stones with their hieroglyphics are lost to us, having centuries ago been torn out for building material required in Cairo, etc. Their absence prevents absolute measurements to prove the exact size, which might testify how near they had then found out the year's length; but the base lengths of the inexorable core blocks, still in position, show that they had approached very near the truth. It may even be that there is a slight difference between our measure of their actual cubit, if they had found the 365¼ days' year, and that the four sides (each representing a year in day-cubit-units) were intended to measure round the Leap-year period of four years as we know it. Whilst I would not entirely deny the possibility of that, it does not appear probable, but rather imaginary.

Possibly the true 365·242 days' year would not be discovered until near the completion of the first known "Sothic Period" of 1,460 years' (*i.e.*, 365 × 4) observations at the Great Pyramid proved the solar year was rather less than the 365¼ days' year adopted during the latter part of the "Sothic Period" of research.

The very careful measures later taken by Mr. R. A. Procter's scientific expedition prove the length of base is 363 of the final pyramid 25″ cubits, representing a shortage of 2 days.

But that is assuming that the 25″ cubit has been maintained at an exact length for 5,000 years, *whereas it probably was ⅛th or ·2 of an inch shorter when the pyramid was built, and in that case the cubit being 24·8 inches long would measure 365¼ times, or days, into the pyramid's base.*

HOW the 25″ CUBIT was probably DERIVED.

Knowing as we do, how standards are varied when being copied, and how liable the original standards still are to deteriorate, even with the extreme care bestowed upon them by government departments now-a-days, we have strong reason to believe that the 25″ cubit has varied in length, and would indeed vary in length even during the generations who lived whilst the series of pyramids were being built.

My investigations have furnished a still stronger reason for believing that the length of the 25″ cubit has varied, particularly in ancient times, because of its being an astronomical unit which could not be measured with absolute accuracy.

No mere arbitrary inches would be applied as an astronomical basis of measure, but rather would those inches be derived by subdividing the estimated circumference of that clearly seen, and only possible, "sky-unit"—the Moon, which has been astronomically handed down to us by the hieroglyphic sign of the (°) degree.

On pages 38 and 39 are demonstrated the most natural method adopted by the Egyptians in dividing the Sun's Arch of Elevations between the Solstices, by the Moon's diameter upon which their old 360 days' Year seems based.

The same trend of thought and desire to keep to nature's unit would naturally lead them to use the apparent circumference of the Moon as the unit for measuring out the circumference of the foundations of their final astronomical pyramid.

But how would they arrive at the length of the Moon's circumference to fix the length of their astronomical cubit?—Obviously, by multiplying the length of the Moon's apparent Equinoxial diameter of about 8″ by π, *i.e.*, $3{\cdot}14159 = 25$″, as near as they knew those factors then.—Here, however, two debatable factors were present:—

(*a*) The exact length of the Moon's apparent diameter, which appeared to be about 8 pyramid inches, and

(*b*) The then but crudely refined numerical value of π as 3″ and a fraction.

The estimated values of both those factors would be refined and made more exact as truer means of observation became available, and more cultured observers developed upon the experience acquired.

Thus in course of time the length of this lunar astronomical cubit would be improved upon, just as our astronomers have in recent years modified their estimate of the *apparent diameter of the Sun*, through the discoveries made manifest by improved instruments of observation, etc., which were not previously available.

Young geometricians almost invariably first measure off the *circumference* of a circle into **6** parts by the *radius* length, and from that erroneously conclude that as the radius is *half the diameter*, the circumference is only **3** times the diameter.

In the same way we may reasonably conclude that the early Egyptian geometricians rather underestimated their astronomical unit of the Moon's apparent circumference length as nearer **3**, than the **3**·14159 times the visible diameter length we know it to be.

The subtle difference between 3 and the true π ratio of **3**·14159 gradually dawned upon men, and whilst we may rest satisfied that the circumference would, by pyramid Times, be known to slightly exceed three diameters, we know that geometricians' ideas of that fractional difference were extended until after the time of the Greek, Archimedes.

About 200 B.C., Archimedes recorded his conviction that π, *the controlling ratio of the circle's circumference to its diameter* (so wonderfully approximated in the Great Pyramid's structure), lay nearer to $\frac{22}{71}$ than to $\frac{22}{7}$; thus proving that, experimentally, his mind was convinced that the former was the more accurate: but his inability to work to finer results (through lack of the then unknown fractional or decimal methods of calculation, which limited him to whole numbers) prevented him from being able to demonstrate the answer, as we should now decimally express it, $\pi = 3{\cdot}1415926+$. Or, we should fractionally state his old results as $3\frac{10}{71}$ to $3\frac{1}{7}$, instead of their divisional limits of expression, as $\frac{223}{71}$ to $\frac{22}{7}$.

In much earlier times the Egyptians, more confined to their **5** and **10** system of counting, probably expressed the π ratio as $\frac{31}{10} = 3\frac{1}{10}$, *i.e.*, 3·1, which multiplied by the moon's 8″ diameter gave the probable earlier **24**·8″ cubit already referred to.

As the apparent size of the moon varies, the Egyptians would naturally fix upon the moon's length of apparent diameter by the distinct line seen upon the lunar equinoxial "quarter moon," when half the disc shows as a semi-circle bounded by the visible diameter, which I estimated to be **8** British inches long, *though the Egyptians would only regard it as a span of space or length.*

To test the merits of my theory, I wrote to the Royal Observatory, Greenwich, for an independent opinion upon the length of the moon's apparent diameter, but was, of course, told that no one would dream of measuring the moon in inches, as it could not be done.—An astronomical friend, who had previously expressed a like opinion, but later saw the probability of my views, advised me to write the Greenwich observers again, explaining what was required, and why. I did so, and back came the Greenwich reply that the "independent observers there *estimated the Moon's Equinoxial diameter at about* **8** *inches when gauged by the eye.*"

That bore out my conclusion, which was still further reinforced by the even more emphatic confirmation of an observing friend in the clearer climate of Egypt.

To present-day-astronomers who have always been trained to think of the moon's diameter as thirty-one seconds (31″) of angular measurement, the idea of its length being estimated in inches no doubt seems strange; but I venture to suggest that the mental estimate non-astronomical people form of the moon's *apparent* shape and size, is more like that of a disc or plate about 8″ in diameter, or about the average length of a man's face.

So it was with the ancient Egyptians before angular measures in degrees, etc., were known. In pre-pyramid times they had regarded the moon's cycle as their long-time unit or "Year" (month), and when they wanted an impartial astronomical unit for building their observatory they naturally took it from the same sacred and indisputable source, the moon, then regarded as a God.

The like crude linear measures would obviously be first applied to measure the APPARENT DISTANCES between the "FIXED STARS." My astronomical friend at the outset ridiculed that idea, but when later asked to point out the distance between two stars to a simple unscientific mind, he, in doing so, inadvertently stated the one appeared about 4 ft. to the right of the other, it was clear the *linear* measure in reality dominated the *angular* measure of degrees, even in his mind.

How naturally the linear measure would be applied to visible star distances by early men, may be judged by the fact that the peasantry of nearly all nations still speak of one star being a yard, metre, or other national measure and its fractions distant from an adjacent star.

That may seem absurd to minds trained to scientific thought, but we must remember that early men were not born with our present scientific ideas and knowledge, which have been gradually developed through our ancestors and transmitted—not by nature's transmission from parent to child, but by communicated knowledge *from mind to mind*, combined with earnest thought and observation in the long ages of the history of mankind until now.

I have already conclusively demonstrated on pages 38, 39, etc., that the "**Sky-unit**," which as the degree (°) is now almost universally used for angular measurement, **was derived from nature's data by dividing the meridian sky-distance between the extreme noon-elevations of the Sun at the Winter and Summer Solstice turning points**, by the Moon's diameter, so significantly forced upon early men's notice as *nature's unit*, when the moon "southed" and was "dichotomized" (halved) at what our ancestors called "quarter-noon" time, each *fortnight*—our bi-weekly

term derived from "fourteenth-night," which has been traditionally handed down to us, from those pre-historic times when our ancestors counted their long-time periods by the moon's phases.

That diameter of the moon as a straight-line unit is shown to the eye as rather under eight inches long when the dichotomized Equinoxial Moon "Souths" (crosses the meridian), and therefore the circumference of the moon which would be about 25 inches long (as $7''{\cdot}96$ diameter $\times$ $3{\cdot}14159$ times yields a circumference of $25''$, or $8''$ diameter $\times$ $3{\cdot}1416 = 25''{\cdot}12$), was the most natural unit the geometrical Egyptians could take to measure the circumference of their Great Observatory Pyramid.

All the evidence we have been able to trace proves that early men sought to find out from Nature's phenomena their measures or units to use as numbering mediums, *e.g.*, they tried to gauge the Solar year in months of the Moon's cycle of 29½ days.

Their study of the Moon's motions would lead them to measure its curved course through the sky by its visible depth or diameter as the unit, which they would notice at its mean elevation sub-divided that curve into about 360 diameters. Later, from the shaded sides of the pyramids they could, during the Winter months, continuously gauge the Sun's diameter when half-disced on the arris-line or edge of the pyramid, and, finding that its visible diameter appeared the same as the Moon, and its daily semi-circular course also extended to about 360 of these regularly graded units, they would adopt them as their Astronomical standard, natural grades or *degrees;* then as the Sun and Moon at their mean elevations generally appeared to be as long below the horizon as above it, they would imagine that their circles would be complete in about 360 more of these disc or diameter units, which they would apply as the most suitable 360 divisions for the circle.

That, I think, most probably traces the origin of the degree, as seems proved by the vividly expressed sign (°).

The usually accepted record of the degree's origin appears to be based upon the old 360 days' year, but I think it is far more likely that the reverse was the case, *i.e.*, the 360 days were based upon the 360 assumed degrees of the circle, which, being applicable to both Sun and Moon, was *probably assumed to be Nature's medium or number ratio*, from which the familiar 90° quadrant, etc., was derived. The 360 days' year consequently became so firmly rooted in the minds of these people as Nature's year, based on the idea that 360 was Nature's base-number, that they most tenaciously held to it through many generations, as the Chinese have done until now.

EGYPTIAN derived UNITS still in use for ASTRONOMICAL PURPOSES, etc.

So far all my investigations indicate that the units of astronomical expression were derived from natural observations of the Sun and Moon. The whole fabric of astronomical knowledge seems to have originated from and continued as based upon those original units which are still in daily use the world over, as evidenced in the Astronomical Text Books, Nautical Almanacs, etc., *e.g.*, the degree sign °, Apparent Diameters of the Sun and Moon, Sun-distance as the greatest unit of space, etc. All these were derived from nature by like methods, as explained on pages 38 and 39.

When practically all our astronomical units and symbols were thus admittedly taken by the Egyptians from nature, and continued down to the present time, —why should the 25″ astronomical cubit, derived from nature's clearest sign, the moon, be objected to?

The 24″·8 or later 25″ unit would simply be regarded as the Egyptian astronomical standard measure of length, just as continental nations take the "metre" as their unit of measure, which we understand as 39·37 of our present inches in length.

If, instead of the 25″ cubit, they had taken 1 millimetre (or any other unit) as a day, and measured 365 lengths for the side of the base, as typifying the year to build such an "Equinoxial sloped pyramid," all those Factors and Ratios, as well as the Sun distance, etc., would of necessity have developed in that slope of pyramid anywhere on the 30th Parallel when measured or calculated in terms of the unit used,—even although the builders or modellers of such pyramids might only know rudimentary geometry and the true use of the mason's slope templet, but were absolutely ignorant of the Sun's distance and higher mathematical knowledge, or even arithmetic.

They simply had to build to the Great Pyramid's height to magnify the daily differences of noon shadow lengths sufficient to differentiate their slightly varying ranges at the Equinoxes each Year.

I hardly dare to differ with such a doughty knight of the sword and pen as Sir Charles Warren, whose extensive researches into the cubits, etc., prevailing in the Ancient Countries of the Central Area which conjoin the continents of Europe, Asia, and Africa, command the highest deference and respect: yet I feel bound to declare my belief that the common cubit of 20·6 inches would not be applied by the pyramid builders, who would for secret religious and astronomical purposes naturally take the most obvious astronomical unit of the Moon's circumference, as the Sun's outline could not be clearly seen.

Sir Charles Warren has (through his valuable Paper in the 1899 July quarterly issue of the Palestine Exploration Fund) dealt so ably with the Egyptian numerical development of π, that interested readers cannot do better than follow his reasoning where detail is required, for which space is not here available.

THE PYRAMID STANDARD 25″ CUBIT.

I can only here deal very generally with the question, particularly as the correspondence hereon between Sir Charles Warren and myself has of necessity been left incomplete through his acceptance of a command in the South African war.

There is good reason to believe that the numerical expression of π arose in the equivalent circle and square methods suggested; but, perhaps, I may be allowed to express the belief that such numerical evolution took place *subsequent to the pyramids being built, and not before* they were built, as he seems to suggest. The simpler Geometrical methods of expression would be used long before numerical calculation was developed.

Stimulus to numeral study would follow the completion of the pyramids, consequent upon the facilities given by the study of pyramid shadows to display the connection between numbers and magnitudes by the ratios of the areas, angles, lines, etc., constantly developed in pyramid triangles. (See pages 53, 55, and 57—Diagrams A, B, and C).

Notwithstanding what Sir Charles Warren has so ingeniously worked out, it appears to me extremely improbable that the pyramid builders would have worked upon a 20·6 pyramid inches cubit. The 25-inch cubit found by Professor Piazzi Smyth seems far more likely to have been used by the symbolical Egyptians, as *the natural quarter of* 100. This 25-in. cubit would appeal to their susceptibilities all the more through their squaring or geometrical methods of calculation, because it represented both the *product* and the *squares* of those two characteristic factors, so peculiar to the true pyramid, *i.e.*:—

	thus for either or both—
5 Sides (including the Base)	$5 \times 5 = 25$
5 Angles (including the Apex)	and $5^2 = 25$

These factors could not fail to be appreciated by the Egyptian priesthood, who knew that from time immemorial the five digits of the hand had been used to express numerical knowledge and measures.—See the five small sun-discs or digits held up by serpents' heads as representing Wisdom, on each side of the Sun Worshipping Monarchs, on page 13.——

Further, the "Pentangle," or "Five-pointed Star," has from time immemorial been the geometric symbol of the Great Pyramid.

In ancient times the "Pentangle" was revered as a talisman or charm over Asia and Northern Africa, and is still used by the Arabs as a solemn emblem for inciting to the faithful discharge of highly important duties.

No other than the 25-inch cubit could be devised as so appropriately befitting their symbolic methods of construction. They were far too practical a people to depend for their cubit's length upon the uncertain length of the king's fore-arm, or proportions from the average stature of their race.

CONCLUSION that the PYRAMID BASE-LINE approximately INDICATED the LENGTH of the YEAR.

I venture to suggest that this 25 inch cubit was the special astronomical unit used by the Egyptians, and that it would almost certainly be derived from the Moon's diameter as apparent to the eye, being about 8 inches, which, multiplied by $3\frac{1}{7}$ (the rough ratio of diameter to circumference), gave 25 inches as the length of the circumference of the Moon's disc, so prominently shown in the earliest Egyptian sculptures.—

Further, it is obvious that they required their unit to consist of complete subdivisions—preferably of fives—by which men first worked.

Sir Charles Warren's conclusion (p. 251) that "there is now no connection between the length of the Year in days in the base of the pyramid" *is by no means established*, because he assumes that "this requires absolute accuracy in the measurement, and fails, as the measurements have been corrected by Mr. F. Petrie."

I submit that such an assumption is entirely unwarranted, and therefore his dictum by no means follows, because it must be evident to thoughtful minds that it was absolutely impossible for those early Egyptian builders to have exactly expressed in building length the 365 days 5 hrs. 48 mins. 45·51 sec., or in days, 365·24219 +, as we now define it, and further, the lengths of the earlier cubits no doubt varied.

It may have been that the variety of shadow experiments had led the progressive section of the prior-pyramid observers to suspect a $365\frac{1}{4}$ days' Year (they could not then have got to the true fraction), whilst the more old-style conservative class held to the 360 days' year, *as the Chinese so long continued to do.*

The experience of men in all ages, especially in ancient times, proves how tenaciously sectional leaders clung to their opinions, and had to compromise their differences; hence, when we consider how hotly debated and contested this question of the length of the Calendar was sure to have been—when it involved the greatest issues of their time, in the permanent supremacy of the Egyptians dependent upon their yearly harvesting food supplies—we ought not to be surprised if, in order to combine all their forces and unite all their strength in the stupendous task of building the Great Pyramid, to finally settle the point for all time, they should agree on the basis of "splitting the difference," by founding the base-lines of the pyramid on the length of $362\frac{5}{8}$ day cubits, which was the *mean* between the two sections.

Now, taking Mr. F. Petrie's measurement of 9068 8 pyramid inches, *which Sir Charles Warren emphasizes as correct*, and dividing by Professor Piazzi Smyth's 25 inch cubit, the result is $362\frac{19}{25}$ cubits, which *is almost exactly the* $362\frac{5}{8}$ *compromised base length*, and noticeably approximates to the length of the Year.

Believing, on the ground of my experimental researches into the Calendar, that the pyramids were erected to find out the length of the Year, *I cannot accept the view that the pyramid designers knew the exact Year's length, for otherwise they would never have toiled in the exacting task of building the Great Pyramid to seek out that information.*—(The Tomb idea being exploded, as already shown, we may ignore it.)

The most that fairly could be expected in that direction from primeval men's symbolic expression of the wisdom of their day, in building form, *would be that the groundwork of their edifice should be based, in cubit lengths, upon the nearest number of days to which they had then found out the term of the Year.*

The **25″ Astronomical Cubit** found by Professor Smyth recorded in the Pyramid Chamber, was probably the refined one resulting from the later more complete pyramid observations, for there is abundant evidence to prove that the pyramid was used as a "*depository*" for the Egyptian Standard Measures, therefore the latest verification of the cubit's length was sure to be placed there.

But that still leaves it possible, as herein suggested, that there may have been an earlier and slightly shorter Cubit in use when the Great Pyramid was built.

Still, after all, the destruction of the pyramid's outer casing, etc., prevents our verifying the exact length of the base at the shadow-floor line, and as the foundation astronomical cubit would for priestly secrecy be purposely kept different from the cubit in common use, and was early liable to change, we cannot say absolutely whether the pyramid builders built the base to the $362\frac{2}{5}$ or 365 days' year; but we may fairly believe on the ground of the evidence already deduced, that the dominant objective of the founders was to find the length of the Year, as roughly embodied in the pyramid's base-lines.

Further, we may safely conclude that the Egyptians did not then know the exact length of the Year, otherwise they would never have laboured so assiduously in building the Great Pyramid to find out the Year's length.

It will thus be seen that whilst the 25″ Cubit is not essential to my case, nor is it needful that it should exactly divide the pyramid base into $365\frac{1}{4}$ day lengths, still a full examination of all the facts of the case strongly bears out the suggestion that the pyramid base-line's length signified the known length of the year when the Great Pyramid was being built.

We all know that astronomers now largely rely upon observations of the so-called "Fixed Stars" as indicating the seasons, still shown on some of our Almanacs by the 12 monthly hieroglyphic signs of the Zodiac, which have been used so long that few persons realize that earlier pyramid methods were used in most ancient times.

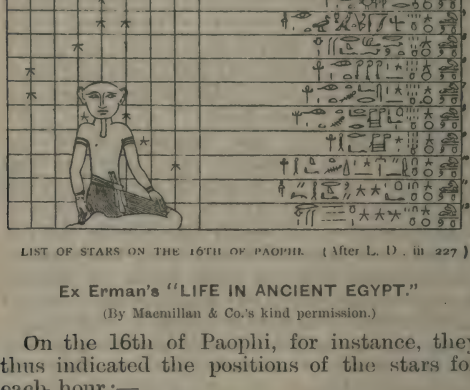
It is interesting to notice where study of the stars superseded pyramid methods in the later Egyptian records.

EARLY STUDY of the STARS as a GUIDE to the YEAR.

The systematic study of Star movements would only become practicable after the study of the Sun and Moon's motions were fairly advanced and the N. S. E. and W. fixed directions of observations were settled by pyramid research.

After that, no doubt, the more easily traced observations then seen to be obtainable by the Stars would give greater prominence to astronomy of the Stars, which would thus gradually supersede or lead to be forgotten most of the old Sun and Moon experiments formerly derived through the pyramid.

Accordingly, we find interest in the pyramids waned, and, during later Dynasties, lists of stars such as the following appear recorded in the temples and tombs :—



LIST OF STARS ON THE 16TH OF PAOPHI. (After L. D., iii 227.)

Ex Erman's "LIFE IN ANCIENT EGYPT."
(By Macmillan & Co.'s kind permission.)

On the 16th of Paophi, for instance, they thus indicated the positions of the stars for each hour :—

"Hour.	Description.	Position.
1st—	the leg of the giant	over heart.
2nd—	the star of Petef	over heart.
3rd—	the star of 'Ary	over left eye.
4th—	the claw of the goose ...	over left eye.
5th—	the hinderpart	over heart.
6th—	the star of thousands ...	over left eye.
7th—	the star of S'ar	over left eye.
8th—	the fingerpoint of the constellation of S'ar (Orion)	over left eye.
9th—	the star of S'ar (Orion) ...	over left elbow.
10th—	the star that follows Sothis	over left elbow.
11th—	the fingerpoint of both stars	over right elbow
12th—	the stars of the water ...	over the heart.

After *fifteen days, on the 1st of Athyr, the stars have moved one point."

The above reproduction of the ancient Egyptian diagram of the Stars with descriptive hieroglyphics, indicates most positively that the early Egyptian system of studying the Stars was by noting their hourly positions above and around some huge figure like the Sphinx, so that the varying positions "over eye, heart, elbow, etc.," could be intelligently recorded for different times, and arguments discussed, as well as theories framed therefrom.

Such a primitive method was most natural when men were first realizing the Year-recording value of studying the Stars' apparent movements. The *difficulty of describing* the moving positions of Stars above the long, straight, unmarked ridges of the pyramids probably led to the living figure system being used, as still applied to constellations in astronomy.

That the pyramid style of observations had long preceded these star figure diagrams is fairly evident from the significant fact that the Stars are indicated by the peculiar π Pyramid sign, which has been conclusively proved to typify the prime factor of the pyramid's shape in hieroglyphic form, as clearly derived from the pyramid system of observation.

Attention may also be directed to the fact that the 12 hours of the day and night were evidently in habitual use when the original of the star diagram was drawn, over 3,000 years ago, as proved by the 12 hieroglyphic record spaces and 12 numbered lines of the Egyptian description.

Other remarkable facts displayed in this diagram, or "List of Stars on the 16th of Paophi," are that at the end of each line the Sphinx is shown with the distinctly marked 90° of the quadrant underneath it—for it seems reasonably evident that the Sphinx was designed and used as a "sighting figure" for the Sun and Moon before even the pyramids were built.—It was therefore all the more likely to be reverted to for descriptive location of the Stars, after the pyramid observations had solved the problem of the Year's length which then first made systematic study of the Stars possible.

These lists of Stars *appear upon the Tombs of the Kings of the 20th Dynasty* (about 1200 B.C.). But as showing that the earlier Egyptian "Year" originally depended entirely upon pyramid methods of tracing the Sun's motion, we have the fact that the *Great Pyramid* and those adjoining it are reputed to have been *built not later than during the reigns of the 4th Dynasty, who lived in history* about 2500 B.C., or considerably over 1,200 years earlier than the compilers of the star diagrams.

From this I conclude that the study of the stars naturally followed pyramid research, and as the old Egyptian "Year" consisted of 360 days, I derive 360 days ÷ *15 days = *24 points* in their Yearly arc. That, as traversed twice each Year, gave 12 marked points in the arc, which was thus counted 2 points per month, just as there were two (Sun and Moon) disc breadths to the degree, and 2 patriarchal (Noah) "Years" to their "Double-Year," or early attempt towards finding the natural Year unit.

Ancient HALF-MOON (15 days) PERIODS of Observation

I would particularly draw attention to the style of record, which in its last line states: "*After fifteen* (15) *days . . the stars have moved one point*," which shows that the intervals between the *points* of record were the 15 days between the "new" and "full" moon, which were obviously the simplest and surest times for early men's reference and comparison of observations.

As the early Egyptian "record points" were registered each 15 days (½-moon), they would count 12 rising points = 15 × 12 = 180 days to the highest Summer elevation, and another 180 days back to the Winter Solstice completion of the geometric year, as outlined below, where the "odd numbers" denote *new moon* and the "even numbers" *full moon* points:—

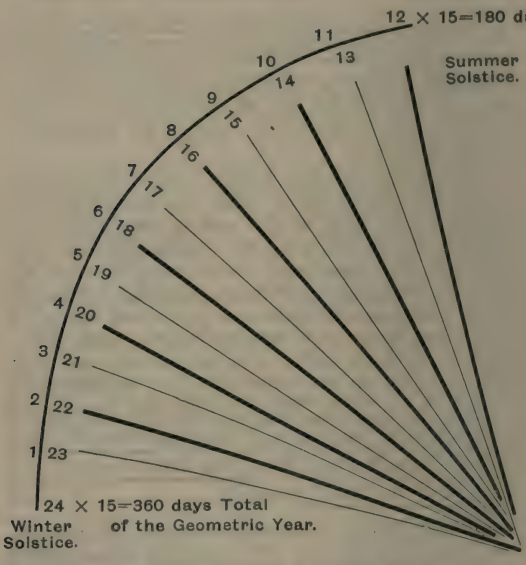


DIAGRAM of the SUN'S MOVEABLE RANGE of ELEVATIONS sub-divided into HALF-MOON PERIODS of 15 days each

Starting with the early noticed 12 moons as approximately sub-dividing the Seasonal Year, they apparently first described it as a curve sub-divided into 12 sections or "½-months" of 15 days each, which would almost certainly be measured along the movable arc of the Sun's 180 days' *rising elevations* (as outlined on page 38, by our six monthly stages) from the Winter to the Summer Solstice, then back by the like 180 days' *falling graduations* to the Winter Solstice, thus totalling the old Egyptian geometrical 360 days' Year, counted in 12 months of 30 days, or 24 of the "½-months," or "15 days' periods."

That antique "15 days' unit" is still in use by most uncivilized tribes, the wandering Arabs, and that race of most ardent conservators of old customs, the Chinese, who, ignoring newspapers, railways, and other modern means of

proclaiming coming events, continue to count their Time by the Moon, fixing the great coming events—even down to a coming massacre—for the 15th day of the Moon, or new Moon; whilst Eclipses are there still held in awe, and though the Chinese great Festivals are permanently held at the Solstices, their Almanac is still, as originally, based upon the movements of the Moon, whose main phases of "new" and "full" moon are 15 days apart.

The 15° of Longitude difference *per hour* of Meridian Time and 15 minutes per Time minute of the arc, provide further evidence of the far-reaching effect which the 15 day ($\frac{1}{2}$-moon) intervals of observation, had upon the Egyptian geometric habits of thought in the early dawn of civilization, as instanced in the 15 intervals or degrees between the Sun's rays of Wisdom, etc., shed upon the Egyptian Royal Family in the illustration of Sun-worship, on page 13.

When we also remember that the Sun's average change of Elevation is 15′ per day we can imagine something of the intense hold this geometric system of *fives* (**5, 10, 15, 20,** and **25**) had in moulding Egyptian methods of thought.

One of the strongest characteristics of the early Egyptians was their rigid adherence to fixed models in every line of thought. Like the laws of the Medes and Persians, which were regarded as perfect and not to be altered,—the Egyptian rules were almost inexorably held, hence the marked tenacity with which they early held to the 15 days × 24 ($\frac{1}{2}$-moons) = 12 months of 30 days each = 360 days' year, which the Egyptian peasantry and common people insisted upon and continued to use as their 360 days' civil year, long after its shortage was proved by the pyramid priests.

No doubt, after the year's length was found at the Pyramid, the coincidence of certain star positions with the Seasons would be noted; but before the Year was known, the myriads of Stars visible through the clear atmosphere of Egypt would appear much more confusing, (because far more are there visible) than through our dull climate.

There the elucidation of Star motions would be retarded by the fact that the brightest Stars, such as Venus, Saturn, etc., which dominated attention, would appear to come round so utterly regardless of the Seasons that it is practically certain the earlier Egyptians would not have attempted to fix upon their Year's length by the Stars, when it was evident to all observers of nature that the Seasonal changes in the Sun's Elevations were both the cause and sign of the Seasons, and regulated the length of the Year.

STAR MOTIONS were only noticed as SIGNS OF THE SEASONS after PYRAMID TIMES.

The Stars were then altogether too insignificant and their movements far too complicated when compared with the bold, impressive significance and simple movements of the Sun and Moon, which were so easily remembered, that it must have been impossible for early men to have freed themselves from the traditionally conclusive and fascinating ideas of the Sun and Moon motions, to trace the year's length by the Stars.

They would not even suspect such a method of tracing the Year during the early centuries of human existence.

To ignore the two bold orbs of light, which by their constant recurrence have always indicated the flight of Time to men, and were regarded as living Gods shedding the divine splendour of the Heavens over the Earth, was absolutely impossible when the clear evidence apparent to men's senses proved, by their every-day knowledge of the Sun's noon change in overhead altitude, and the seasonal lengths of the shadows cast from trees and other erections, that the Sun's elevations in the sky indicated the Times of the Year as entirely dependent upon the Sun.

The beginning of the New Year, with the Inundation (flooding of the Nile) Season, was most anxiously awaited every year in Egypt, as the success of the crops and general prosperity of the nation depended upon the extent and continuation of the over-flowing waters.

In the course of the later pyramid observations it would be noticed that the "Dog Star" (also called "Sothis" and "Sirius") appeared near the rising Sun about the time the *Inundation* began. The importance of this observation (which could be watched not only from the Pyramid, but all over Egypt) grew until ultimately it was traditionally accepted by the scattered peoples (who as yet were without almanacs or written records), that their New Year began with the *helical rising* of the "Dog-Star Sothis."

On the temples, monuments, etc., of the more descriptive Dynasties, which existed centuries after Pyramid Times, are repeated references to the Yearly Inundation of the Nile almost coinciding with the annual reappearance of the Dog Star "Sothis." These appear to have misled early Egyptologists, and led to the hitherto general belief, that the Egyptians found out the length of the Year by the Stars, and more particularly by that special Sothic indication.

Additional force was given to that erroneous belief, by the great importance the Egyptians evidently attached to the great Sothic period

of 1,460 years, already referred to. But that long star period, so characteristic of the patient habits of the Egyptians, only shows the immense national importance attached to regularly tracing the progress of the Years, which could be readily noted and checked by these Star observations, after the true Year's length had been derived by the Great Pyramid and the counting of the Almanac days was established.

The later Egyptians would never revert to the cumbersome, obsolete pyramid methods, after the Star or Zodiacal method became confidently known and was proved to be reliable. They would no more go back to crude pyramid ideas, than we should abandon quick, smooth railway travelling, for the tedious, jolting transit by the "road-wagons" used a few centuries ago.

The rising of the star "Sothis" drifted with the "Precession of the Equinoxes," and the Inundations so far fluctuated in their time of rising (as well as height and extent), that reliance could not be placed upon them. —Only last year the Nile Inundation was three weeks late, and may in other years be a few weeks early, giving a most uncertain range of several weeks, as against the absolute year-end which was indicated by true pyramid shadows, to the exact fraction of a day's length.

I cannot bring myself to believe that early men found out the length of the year by the stars, as general experience and enquiries evidence the contrary, and establish my firm conviction that practical and effective study of the apparent stellar motions, only became possible after men found out the year's length by studying pyramid shadows.

My own experience, which is strongly supported by the enquiries made from other persons, shows that even now, in our enlightened time, very few people outside the ranks of astronomers know the seasonal positions of the Stars, which are commonly regarded as unimportant.

But for the fortunate coincidence of the following remarkable combination of circumstances (which are explained more fully in the last pages of the Almanac Section), I should probably never have noticed that the so-called "Fixed Stars" are varied in their apparent positions with the Seasons:—

1.—Our front-door being faced due North;

2.—The hill opposite surmounted by a Windmill with a "lightning conductor," forming a "Sighting Staff" ready to hand at a good elevation;

3.—My regular habit of going out to catch the 8 p.m. post;

4.—My accidentally noticing one Star disced over the "lightning conductor" one night in December, *at 8-0 p.m.;*

5.—Similarly noticing that another Star appeared to have displaced the former Star over the "lightning conductor," on a night towards the end of the following week—*also at 8-0 p.m.;*

6.—My remembering that the two "sightings" were taken at the same time (8-0 p.m.), but on different nights, nearly a fortnight apart;

7.—My realizing the utility of the "lightning conductor" as a fixed "Sighting Staff" for tracing the apparent motions of the Heavenly bodies.

Had any one of those circumstances been wanting, or failed to be noticed by me, no impression whatever of the apparent movement of those stars would have been made upon my mind.

So it would be with early men, who, even if they knew that the Stars appeared to revolve round the Earth every 24 hours (as very few people yet realize), would by that knowledge be retarded and practically become blind to the fact that the "Fixed Stars," in addition to the daily, also show a yearly motion, which glides on, *round the same circle*, by almost imperceptibly slow variations, which again are further varied by the much slower changes of position which we call the "Precession of the Equinoxes," etc.

The four-sided, taper-pointed pyramid was a highly suggestive instrument for later tracing out the apparent annual circular motion of the stars, which could be watched from every side and corner of the pyramid. They could also be followed round, whilst the compass points were clearly located by the pyramid's true orientation and characteristic shape.

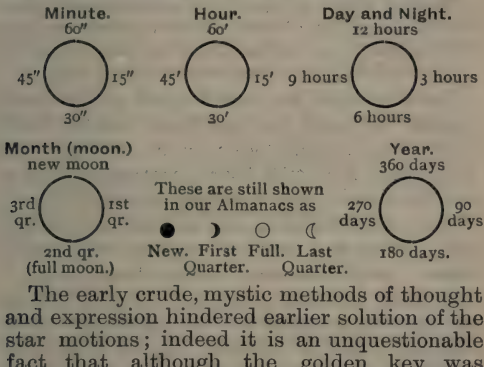
Before such a huge, fixed, and clear-cut -edged observatory, so ideally sloped and ridged, was erected, it would not be practicable for men to trace the extremely gradual daily over-lapping of the *yearly cycle* among the stars, which could not be distinguished from the end of one and the beginning of another *daily cycle*, until long-continued and very precise observations were recorded and timed down almost to exact minutes of observation.

To readers who think that the early Egyptians could trace the star cycles as our astronomers do, I would reply that such thought assumes, that the ancient people possessed much of the vast accumulation of astronomical knowledge humanity has derived during the 5,000 years which have since elapsed; whereas the pyramid erectors were only just beginning to collect and generalize the elementary facts displayed by the motions of the Sun, Moon and Stars, to gather true knowledge of the Seasons and Year.

INTENSE MENTAL EFFORTS and PROTRACTED OBSERVATION needed to SOLVE the PROBLEM of the apparent ANNUAL MOTIONS of the STARS.

What gave fuller force to the later general use of the Stars as indicating the Seasons, was, that they could be much more conveniently sighted everywhere on clear nights, and were easily discerned without laborious erections; whereas the pyramid method prodigally used up immense energies, and was only understood by privileged pyramid priests.

To the *post-pyramid* noticed circular motion, was largely due the strong geometric hold which the apparently conclusive demonstration of Time in all its phases had upon early modes of expression, when drawn as complete circles with sub-divisions, thus:—



The early crude, mystic methods of thought and expression hindered earlier solution of the star motions; indeed it is an unquestionable fact that although the golden key was provided in the pyramid ascertained year's length, the true theory of star motions was only born to human knowledge by the protracted mental exertions of Copernicus, between 1500 and 1543 A.D., *i.e.*, over 4,000 years after the Great Pyramid was built.

The intense thought needed to deduce that knowledge from nature's confusing array of stars was not forthcoming till that great thinker broke through the dogmatic bonds and priestly theories which had fettered the ideas of earlier men.

That great effort prostrated even the immense energies of Copernicus, who only just lived to touch the first copy of his book on the Stars. He was only able to consciously regard his work for an instant ere he relapsed into insensibility before death.

Almost equally pathetic was the end of that great master mind, Kepler, after his exhaustive labours, between 1600 and 1630 A.D., had reasoned out the laws by which the Star motions were explained.

The vast number of carefully recorded observations required to be analysed, located, and calculated out for testing comparisons, etc., as well as the great reasoning master-minds, were not forthcoming until then, when public freedom of thought became recognised, and methods of expression and astronomical investigation were sufficiently developed.

The mentally endowed or differentiated men of the past protruded the growing force which was developing a higher civilization. They could never have anticipated the difficulty which races thousands of years later would experience in grasping such early symbolic expressions as were used in pyramid and pre-pyramid times. The Ancient Egyptian leaders in thought would practically know much more of elementary science than their limited vocabulary or few hieroglyphics could possibly be made to express, particularly in numbers.

The mystery hitherto surrounding the Pyramids and the Sphinx seems largely due to that poverty of expression, or means of representing thoughts, which undoubtedly crippled and retarded those pioneers of civilization. Even in the full glory of the cultured Greek Empire these pent up, inexpressible ideas were manifest, as recorded by Archimedes (see page 105).

None of the writers I have so far seen appear to have laid sufficient stress upon that unavoidable poverty of thought and language, and still more restricted means of hieroglyphic record which marked the portrayal of thought by the ancient Egyptians, etc., when the earliest rays of civilization were only dawning upon them.—*They knew very much more than they could express by symbols or writing.* To make my point clearer, I may be allowed to give a personal example which commanded my respect for uneducated genius, and emphasized the almost insurmountable difficulty untrained minds experience when trying to explain their ideas.

Not having any home on leaving school, I was lodged with a poor family, whose only son had died three months before, and as they desired to fill the aching void, I was, as far as practicable, treated as a son. It is quite impossible to convey to the higher and more artificial strata of Society the keen and tender regard the family had for their late son's memory. For years, the whole of the mother's Saturday afternoons were spent in earnest attentions at his grave. Although I had a dislike to cemeteries, and no direct knowledge of the deceased son, the family sincerity so far impressed me that for about two years I hardly ever missed going, on alternate Saturdays, with the frail mother to fetch her water from a distant well for the flowers, etc. This is only mentioned to prove the son-like unity of interest between the family and myself, through which it is certain the father (Mr. William Carr) freely gave me the benefit of all his working experience.

Despite the fact that he had never had a day's schooling in his young days, and been utterly neglected by his parents, he had at the Friends' Adult School picked up in middle age sufficient knowledge in reading and writing to keep himself informed in useful matters. But beyond that, his general intelligence and sound judgment were very wonderful.

As a pavior under the York Corporation he laid the granite-set roadways, etc., and was privileged to contract for new street paving, and, being very industrious, also contracted for evening work in paving private stables, hotel and court yards, etc., which in the old city of York are most irregular in shape. These had to be measured up as payment was per square yard. Mr. Carr used to stride across the areas in exact yards, and on taking the last stride muttered in mental calculation, "say 35 score and 16 = 716 square yards."

I was expected to find the yardage by tape measure, triangulation, etc., but although I had during several previous years never given less than three hours per day private study to arithmetic and mathematics as my hobby, I could never get the working figures down, much less the result, before this untrained man gave the correct answer. In reality he measured by intuitive means whilst I checked on educated lines, yet he never appeared on large areas to be two yards out. I had never been beaten in figure tests at school, and knew he had never learnt arithmetic, so I struggled hard to get the result first, but failing, tried to get him to explain how he did it. He was most anxious to explain his method to me, still, beyond a hazy idea that he mentally rolled over a ladder 20 yards long, having steps one yard apart, as representing the scores involved, *he* COULD NOT *more clearly express his system*, though he could estimate areas of varying sections, almost at a glance.

Some reader may laugh at that ladder-like method, but I can assure him that pondering over that curious thought, many years later, enabled me to discern the most useful numerical factor I have ever learnt—the application of which will greatly reduce, and probably revolutionize the present system of computing most widely used calculations throughout the world.

The difficulty of expression was experienced by Mr. Bidder, Q.C., the great naturally trained calculator, who admitted in his remarkable paper read before the Institution of Civil Engineers, that, outside the fact that he always multiplied numbers from left to right in direct opposition to school methods, he, though then highly educated, could not completely explain his mental methods which were passed through his mind so quickly and naturally by his intuitive mental methods and grasp of fractional, etc., values.

Even in my own small way of working out great masses of figures, I have to confess that self-acquired means (so far as I know, quite unknown to others) are employed, which it would be extremely difficult to make clear to the general reader —— just as the illiterate old Yorkshire farmer could not explain to others, how he kept all his life's trade transactions recorded by variously invented knife-cuts on the wooden palings round his garden —— a probable survival or inherited trend of the old "clog Almanac" system of record.

METHODS of EXPRESSION have ever been CONSTANTLY EXTENDING AND IMPROVING.

We Britons are too apt to assume that our mode of expression by writing and printing is almost perfect, whereas it is still encumbered by many most absurd anomalies, and a confused system of spelling which is a burden and sheer waste of mental effort to us all.

If, as an Empire, we so far simplified our spelling as to make the written language phonetically express the spoken sounds, as the Italians have done, we should hasten the time when the English Language would confer the world-wide boon of a commercial and possibly international language on the world.

We are constantly tinkering at it, instead of taking its revision systematically and thoroughly in hand. We have not even got so far as to have an orthographical or other educational department arranged as what we might more rationally call the British Language Bureau, to decide the best form for disputed words, though we have dictionaries in profusion giving different renderings.

Our more go-a-head American cousins push us along faster, but "John Bull" is heavy to move. They first sensibly rationalize some of our most noticeable inflictions for us, and we slowly follow their lead, *e g.*, for *plough* they say and write *plow*, so expressing the truer sound, and saving ⅓rd of the written or printed word.

In these days of hurry and scurry, the long-hand system of writing and printing is proving so cumbersome, that the use of contractions and shorthand is spreading, and likely to come into more general use in the near future.

By the foregoing facts we may realize that though our methods of expression are still trammelled by traditional excrescences and defects, they are still improving year by year, —as they have been doing during over the 5,000 years, through which the methods of expression have continuously and so enormously increased since Pyramid Times.

Graphic expression was in its infancy when the pyramids were built. Yet the practical Egyptians managed to portray rudimentary expression in such telling forms as were understood at a glance.

Take, for instance, our word *water*, which they expressed as , so instinctively suggesting the ripples caused by a breeze on the water.— That graphic expression, so typically used by the pyramid Egyptians as the watery sign of the Zodiac, was borrowed by the Greeks, and handed forward by the Romans, etc., through all the Almanacs down to this day, where still appears on our nautical and general Almanacs for "Aquarius," our *watery* sign of the Zodiac for February, which we all know as the rainy month.

Such simple expressions were easy in early Egyptian hieroglyphics, but more elaborate ideas such as *clear*-water, *putrid*-water, *hot*-water, *tepid*-water, etc., were much more difficult, whilst compound numbers and ratios, such as $\pi = 3\cdot14159$, could not possibly be recorded beyond the diameter and circumference ratio recorded as ⊖ in the Great Pyramid's interior, until the culture of many centuries developed a more perfect and flexible system of numerical expression, as well as far higher mathematical knowledge.

Similarly, descriptive ideas of the "Flight or passage of Time," were recorded as pairs of wings flying with the Sun, to remind all of the ever-present fact of the "Flight of Time."

Not only do men's national methods of expression change, but also their collective ideas change within comparatively short periods, as instanced in the remarkable diversion of holiday seekers from the old health resorts of Bath, etc., to the Sea-side.

I have a standard book on health, written by a physician in the early part of this Century, in which great prominence is given to Bath's advantage as a health resort, through being "*far removed from the noxious fumes of the sea.*"—Yet we all now admit the health restoring powers of the sea-breeze, and without doctors dilating upon the benefits of "ozone," the people, almost with one consent, now make for the sea-air.—The pity is that the rush of August is not spread more conveniently over, say, May and June, and that the freer hamlets along the coast-line are not more frequented, to relieve the congestion of the larger sea-side resorts.

As health and holidays are so highly valued now, we may fairly argue that these recent changes of thought and habit, are quite as complete and finally over-ruling, as was the change of the Egyptians from pyramid methods, to the more generally useful star methods of seasonal observation.

All such yearly care and trouble in fixing upon the seasons is saved to us by our accurate almanacs, which are based upon the accumulated astronomical and practical knowledge we have inherited from the researches of the great minds of all nations in the past.—The printed almanacs, now so abundant, are easily understood, *through the highly developed graphic expression we enjoy.*

Not only had the Egyptians to establish the yearly system of Time, but, locally, they had to record and sub-divide the daily time for purposes of governmental, labour, and social needs, just as we find it necessary to have clocks.

For that purpose they invented the erect and permanent "Obelisks" which, by the same principle as pyramid-shadows, served to show the public time throughout the hours of the day, by their shadows as the sun daily described its arched course across the heavens.

OBELISKS.

Obelisks, aptly called "Fingers of the Sun," were used by the Egyptian priests, and were meant to be both *useful* and *ornamental*. They were most *useful* as colossal Sun-dials or Gnomons, to tell the hour of the day by their shadows pointing to the hour-marks cut upon the dial pavements on which they stood. As *ornaments*, they were used as wall decorations, supports to statues, etc., but their prominent places were before the Temples of the Sun, and in the centres of the public or palace squares. Their sides were covered with hieroglyphics recording astronomical observations and historic events, such as have always been associated with Almanac records.

Just as our rustic ancestors used "wooden Calendars" or "clog Almanacs" upon which the leading days and events were cut deeper with a knife, so these obelisks recorded the events of their day, along with some astrological absurdities which, though now almost disappearing, have been continued in Almanacs down to our present day.

Yet, most of the obelisk hieroglyphics gave useful information regarding such astronomical points as we should expect to find in the history of the race, to whom it was of recognized national importance that they should locate particular periods of the year.

Like the "vertical stones" of all other countries and ages, these obelisks have been quarried at great distances from their place of erection, and are conspicuously cut out of the hardest and most lasting stone, to resist the ravages of Time and endure to the remotest posterity.

The 66 ft. high Obelisk, set up by Usertsen I., about 2,433 B.C., at Heliopolis, the scriptural "On," of Egypt, is called on account of its great age, "The Father of Obelisks." It marks the centre of the public square, which served as its shadow's dial, to indicate the TIME to the worshippers coming to the famous "Temple of the Sun," the front of which it adorned, at "On," the native city of Joseph's wife. Its inscription reads:—

"Horus, the god of the Sun, the life for those who are
"born, the King of Upper and Lower Egypt, Kheper-
"ka-Ra, the lord of the double crown, the life of the
"born, the Son of the Solar God Ra, *Usertsen*, the
"friend of the spirits of On, ever-living, the golden
"Horus, the life of the born, the benevolent God,
"Kheper-ka-Ra, has executed this work, *at the begin-*
"*ning of a 30 years' cycle*, be he dispenser of life for
"evermore."

Compare with the Obelisk Translation on page 145.

There the prominent idea is the Sun-god, Ra, and the expressed erection ***at the beginning of the 30 years' cycle***, shows how indelibly TIME dominated those early Egyptian minds.

The 30 years' cycle may mean 30 moons or periods of 30 days = 900 days (as there is no astronomically marked 30 true years' cycle)—if so, it proves the moon's cycle was commonly used as a long-time unit till then.

OBELISKS and MONOLITHS were inadequate for DIFFERENTIATING the YEAR-ENDS.

Some reader may urge that Obelisks and Monoliths, or something like the tall chimneys of to-day, would have attained the Year-finding object, or possibly, even have been better than the pyramid, by showing the shadows for the Summer months as well.

That is quite illusory, as sufficient height could not thereby be attained in Egypt to determine the limits of the year; and it was practically impossible to get sufficiently high erections *vertical*, as was absolutely essential to work out the Year by shadows, **whereas the pyramid style gives the most absolute guarantee of the apex being VERTICAL and CUT OFF AT THE RIGHT HEIGHT—both of which are vital factors in the π pyramid.**

Obelisks, etc., at 30° N. Lat. would show the time of day and the Seasons near enough for ordinary use, but their short shadows could not sufficiently differentiate their daily gradations to trace out the Solar Year's end; though at 50° or 60° Lat., Obelisks or Monoliths of much less height, as found in those Latitudes at Stonehenge, Brittany, etc., might approximately indicate the Seasons, because their lower local elevations of the Sun throughout the Year, ensured far longer shadows, which might be roughly traced to approximate accuracy during clear sunshiny days at the Winter Solstice.

The half-hourly shadows shown by the close-cutting cross-lines below the cone and pyramid bases on pages 52 to 57 are thrown from the Sun's Mid-Summer Elevation of 59½° at York (Lat. 54° N.) Although they are scaled direct upon the finely-ruled square sections of the large diagram paper 80″ × 40″, from models 15″ and 9″·13 high, their daily variations are too minute to trace the length of the Year within an error of some days, but the 25 feet Druidical Obelisks near by, at Aldboro', might give the required size to ensure approximate accuracy in days. Their mid-day shadows would be proportionately longer than the higher Obelisks in Egypt, because of the 24° higher Latitude. The 54° Latitude is nearly double that of the pyramids; and as the lengths of shadows increase in greater ratio than the mere additional Latitude, the Aldboro' Obelisks would, whenever the noon Sun shone brightly, cast even mid-day shadows traceable throughout the year, instead of being limited to the Winter months, as were the Great π Pyramid's monthly shadows, shown on page 60.

On the other hand, Obelisks, etc., erected at less Latitudes would show rapidly diminishing shadows, until, within Egypt, we should find them too short to differentiate—indeed, during part of the Summer, no daily differences of shadow lengths could be traced, so that the changes of the Seasons could only be discerned to within a week or so each year.

It would therefore be impossible to accurately trace the year's length from the short shadows of Obelisks or Monoliths, as the Sun's daily changes at the Solstices and Equinoxes were imperceptible.

The ANNUAL INUNDATION of EGYPT by the NILE, was NOT SUFFICIENT GUIDE to the YEAR'S LENGTH.

No doubt, the approach of the Rainy Season in the Tropics would be taken as a rough guide, and the consequent Yearly rise of the Nile would approximately indicate the recurring Year, as the need of grain crops forced agricultural pursuits upon the earliest races, thereby giving a greater incentive to the observance of the Seasons.

But men have since learnt from the sad experience of Famine that Tropical Rains vary in their copiousness, and, what is more to our point, they fluctuate many days in their time of coming, hence, no definite length of Year could be found to within a few days from their periods. In proof of these facts, we need only take the present year, when a great Famine has been produced in India, etc., through lack of rain. Again, the newspapers last year bemoaned the late and uncertain rise of the Nile, which for the year 1899 is remembered as a "bad or low Nile."

In these days of the telegraph, telephone, etc., with the engineering appliances available, and our matured knowledge as to the length of the year, it is relatively easy to arrange the right time for opening the irrigation canals or dykes which convey the flood-waters of the Nile over the land to fertilize the valley of Egypt. But 5,000 years ago, before the length of the year was known, the conditions were very different. The Egyptians could not be sure how high the Nile would rise in any given year until the critical time was past. The priestly rulers had to decide, as a matter of policy, when the flood-gates should be opened. Could they have known it would be a protracted flood, they would delay the opening, and let the earlier part of the flood out direct to the sea, whereas, if a short flood-time or "Bad Nile" was anticipated, they would have opened the flood-gates directly the water levelled up to them. Further, during "Bad Niles," the rulers had to guard against the people of Upper Egypt absorbing too much of the water available for irrigation to the prejudice of the greater population of Lower Egypt.—We thus see how extremely important and highly valuable was the knowledge of the true year's length for national purpose.

They had to depend largely upon reports brought by boats or camels from Assouan and other points hundreds of miles up the River, when the water was racing down as fast or faster than the messages. Again, after these reports were received and considered, orders had to be sent by messengers to the many distant points at which the flood-gates were fixed, to tell the people when to let the water flow out upon the land; whilst in anticipated "Bad Niles" provision had to be made for the artificial irrigation of the higher lands by means of tedious lifting buckets, hung from pivoted poles, forming the primitive idea of pumps.

The tedious delays to messages, of doubtful value from their uncertain basis of information as to what height the coming Nile would rise to, vitiated the full effective use of the highly-prized inundations most seriously before the length of the year was found. They lacked that most dominant and valuable factor which alone could enable them to discover the true mean date of the Nile floods, because, so long as the actual year's length was unknown, their estimate of it by the time elapsing between "High Niles" would vary so far from the truth that the error would accumulate to be perplexingly and disastrously misleading in a few years.

With the aid of the present Calendar, it is perfectly easy to know whether the "High Niles" for any two past consecutive years were respectively *early* or *late*, but before the Calendar was invented, it was almost impossible to say, within a few days, whether the previous year's "High Nile" was *early* or *late*, and, therefore, it was impracticable by such comparison to say whether the then current year's high flow was *early* or *late*.

If the former year's inundation was actually EARLY, and the next one LATE (or *vice versa*), the difference would be so greatly aggravated, being about doubled, that we may fairly conclude that the required term of the year could not be exactly ascertained by primitive men from the yearly inundations, which still vary, as instanced by the following Press Extract, 27th Nov., 1899:—

"The revenue of Egypt for 1900 is estimated
"at £E 10,380,000, and the expenditure
"at the same figure——*The principal*
"*feature of the budget is the loss of revenue*
"*anticipated next year, owing to the very low*
"*and late Nile flow this year.*"

The national loss due to that low and late Nile, is readily understood when we remember that the *land-tax* and *agricultural rents* are still rightly levied according to the height of the Inundation, which regulates the fertilizing value of the soil during the ensuing year.

That equitable national system of levying rent and taxes, to the exclusion of rapacious landlords, seems to have originated from the wise rule of the great Joseph of Ancient Egyptian and Bible fame, who probably also introduced the public 12 months' year, as evidenced further on. Absolute proof of that can hardly be forthcoming, owing to the exceedingly crude and scanty records we have of that very remote period.

How the stereotyped methods of expression restricted the progress of the Egyptians until writing succeeded hieroglyphics, we see plainly from the fact that, although Egypt led the van of knowledge for about 2,000 years, yet their first national history was not recorded until Mantheo, *high-priest of On* (Heliopolis), wrote it about 200 B.C., in that old centre of Sun-worship, which we remember was the birth-place of Joseph's wife.

The YEAR'S LENGTH COULD NOT be found by NATURE'S SIGNS of varying TEMPERATURE, the TIMES of TREES BUDDING, FRUITS RIPENING, etc.

Some objectors may urge that men could fix the Seasons, just as animated nature does, *e.g.*, the birds know roughly certain Seasons.

No doubt, the earliest men were limited to like imperfect guidance, whilst like the birds and animals they failed to "till the ground," with the result that bad seasons decimated the race, just as the thrushes were misled two years ago by the mild winter to lay their eggs and hatch their young in the gardens behind our house in February, the result being that the cold March weather killed off the nestlings and oldest birds too, as also occurred this year, when snow fell on March 26th and 27th.

When men began counting the days of the Seasons, *their "little knowledge would be a dangerous thing,"* because they could not know and appreciate the differences which misled them, and by accumulating the erroneous differences in following years, brought disaster to their crops and other food supplies.

We know that birds, and even animals, migrate in bad Seasons, whilst early historical records establish the fact, that early men also migrated (*i.e.*, Abraham, and later Jacob's family, as well as the Ishmaelites migrated to Egypt for food), though they could only do so to a limited extent, and as population and their belongings multiplied, the difficulties of migration increased, until ultimately it became impracticable.

But those great difficulties which retarded and stopped migration, would force agricultural pursuits upon the chieftains, who were thus compelled to observe and study the Seasons.

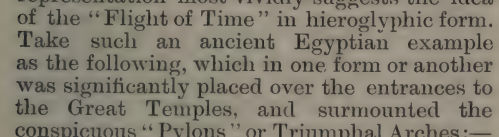
The Seasons by their variation in temperature, and the varying times at which the grass began to grow, trees to bud, fruits to ripen, etc., could only give such vague ideas of the Year and true Seasonal times, as would be gradually realized to be dangerously misleading to the growing population of Egypt in the earliest times.

They had to turn to the Sun as the source of the Seasons, which they could best measure by noting Sun-shadows, as it is not at all likely that up to that time the Egyptians had thought of tracing out the Year by the minute Stars. These would later be thrown into prominence by their Seasonal recurrence being noted by the pyramid-keepers' observations for Sunrise and Sunset, when the changing positions of the Stars were gauged by their bearings from the pyramid's outline. Had they thus known the Star positions before they began building the earliest pyramids, their first erections would have been truly orientated, as they must have known the supreme importance of that factor in dealing with Sun-shadows, because the slightest inclination of their experimental staffs, tripods, obelisks, etc., would prove the absolute necessity of their erection being rightly orientated to ensure true results.

HIEROGLYPHIC or SHADOW SIGNS denoting the "FLIGHT of TIME."

The question arises, what indications are shown in Egyptian records that they observed and recorded Pyramid and Obelisk shadows in this manner?

Unfortunately, about 47 B.C., the Romans ruthlessly burned the great and most ancient Library at Alexandria, which would naturally contain such records, along with all the oldest astronomical data, which we know were treasured there. We are therefore left to depend upon the less direct evidence of hieroglyphics or picture-writings, which we must bear in mind were only known in their most elementary forms in those times of Pyramid Building.—Yet those which I have been able to trace, appear to confirm the ancient use of such "shadow-grams" as were outlined direct from the π pyramid (C) by the Sun's rays on pages 53, 55, and 57, where the *wing-like* representation most vividly suggests the idea of the "Flight of Time" in hieroglyphic form. Take such an ancient Egyptian example as the following, which in one form or another was significantly placed over the entrances to the Great Temples, and surmounted the conspicuous "Pylons" or Triumphal Arches:—



WINGED SCARABÆUS, like OBELISK SHADOW WINGS.

This seems a perfect adaptation of the shadow-wings, as picturing crude ideas of the "Flight of Time." The illustration most typically bespeaks the flight of the MONTH as the first long-time measure which men could grasp. The top two short wings of five feathers or pinions may together be taken to represent the ten days of the original Egyptian week divided, as they obviously counted five on each hand. The ten spaces between the top and bottom wings were coloured yellow, as representing the weeks, which unite the days of the week to those of the 30-day months, naturally sub-divided at "full moon" into halves or 15-day periods.

It is significant that in the original both the top small pair of wings and the largest (lower) pair are coloured blue, which we may take to mean that both were representations of passing days, where each pinion counted for a day.

Like my "shadow-grams," the latter are longest at the outer wing tips (representing the first (West) tips of the New Moon), and decrease from the West to the meridian-line, which is reached at Full Moon in the fifteen days, shown by fifteen feathers. Continuing for fifteen days more, the end of the other wing is reached as the last ring (or Eastern horn) of that Moon disappears. How it came about

that the next sighted Moon began to show its ring on the opposite (Western) side would be a mystery to early generations, so engrossing their attention, that, with the other points before-mentioned, would imperatively lead the earliest men to adopt this lunation period (month) as their first long-time-unit, or "Year."

Is there any other representation which could more vividly depict the "Flight of Time" by the month ("1st Year" of men)? No! Especially when we consider its suitability to ancient thought and expression.

In later ages these Hieroglyphic or Wing-like representations of the "Flight of Time" would naturally be applied to indicate the reigns or lives of subsequent Egyptian Kings and Queens, which of course varied in their number of years, *consequently we find examples where the years represented by the pinions in the King's wing, vary from those outlined in the Queen's wing of these bird-like symbols.*

The remarkable resemblance of the East and West "π Pyramid shadow-grams" to the wings of a bird calls to mind the very great prominence of such winged creatures in early Egyptian paintings and sculptures, of which the following is a typical example:—

HAWK with a RAM'S HEAD.
(Ex Erman's "Life in Ancient Egypt," Published by Messrs. Longmans.)

This old Egyptian ideal of Horus, "the Sun-God" (son of Osiris and Isis), is portrayed by the hieroglyphic of a Winged Hawk on the portals of the ancient temples.

None of the birds we know of have such peculiarly shaped wings, etc., which are much more like the wings of pyramid or obelisk shadow-grams, from which they were probably taken, for it is almost certain that small model pyramids and obelisks would be used as patterns and mementoes from which their shadow-lines would be diagrammed, as I have done.

Small pyramids and cones about the size of my models have been frequently found in Egyptian Tombs, etc., and it is worth noting that the above wing-like emblems were also found placed upon the breasts of mummies.

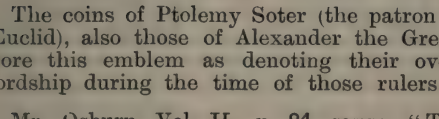
The Egyptian scholars undoubtedly used Obelisks, which were proportionately so much longer and narrower that their shadows gave unmistakably closer resemblance to the feathers or pinions of the "wings" above.

It is more than remarkable that, before I had ever seen any of these curious winged creatures outlined, I had quite naturally named the right and left portions of the shadow-grams "wings," when showing them to friends, and described them as graphic representations of the "Flight of Time."

This, apparently, explains the meaning of those ancient pictures, which, until now, Egyptologists (so far as I can trace) have admittedly failed to solve, for I submit that, as TIME was the great thought in early Egyptian minds, they graphically recorded it in this simple, yet most effective way.

A most striking corroboration of this conclusion exists in the six semi-circles surrounding the head of the foregoing "Hawk with a Ram's Head," which clearly accord with the six monthly semi-circles of the Sun Elevations on page 16, and the six monthly steps of the Sakkarah Pyramid, etc., previously referred to as the "moon periods" (our months), which were the most common-sense gauges available for measuring the Year, or the "Flight of the Seasons," by the Sun's Seasonal Elevations.

The Two Eyes under the horns, representing "the two great eyes of Heaven" as the Egyptian Twin-Gods the Sun and Moon (*two discs to the degree*), appear to have been developed from the same trend of thought, through examples like the following, which the late Mr. Osburn adopted as the cover sign-mark for his valuable book upon the "Monumental History of Egypt," 1854:—



The coins of Ptolemy Soter (the patron of Euclid), also those of Alexander the Great, bore this emblem as denoting their over-lordship during the time of those rulers.

Mr. Osburn, Vol. II., p. 84, says:—"The "golden hawk, which was one of the fishing "eagles of the Nile, seems from the first to "have been made the impersonation of a king. "*We are as little acquainted with the motives* "*of this symbolism as with those of most of* "*the others in the entire system.*"

I suggest that this symbolism, *dominated by the idea of Time*, represented also the king's "over-lordship," or timely overlooking Egypt, just as seen by the keen-eyed soaring hawk which typified the Sun-God "Ra" as the direct source of wisdom and power, from whence we remember the king and his family were held to receive their god-like and unquestioned ruling virtues.

TYPICAL EMBLEMS of the "FLIGHT of TIME."

These wing-like symbols of the "Flight of TIME" have been transmitted by the Almanacs during all these thousands of years, and are still used, as may be seen from the following:—

which is photo-engraved from the title-page of "Whitaker's Almanac" for this year (1900).

On the last pages of the "Addenda" I explain how the Ancient British Druids in prehistoric times used the huge conical erection of "Silbury Hill" (Wiltshire) in similar manner to that employed by the Egyptians, to determine the Year's length for their Almanac; and on pages *z* and *z9* are shown Druidical symbols, which were held in the hands of the Arch-Druids, and adorned their dresses for great occasions.

The almost identical moon-section-shape of those symbols, with those shown on page 13, near the hands of the Pharaoh and his Queen, indicate that both races were independently seeking out the Year's length, by studying the Sun's seasonal curves, as diagrammed in moon-periods on page 16.

It is an authenticated fact that in very ancient times, the Egyptians used to locate the most northern reach of the over-head Sun, by a shadow-well *hewn out in the rock* South of Assouan (Syene), where the *noon* Summer Solstice Sun hovers over the Tropic of Cancer, and then turns back towards the Equator as Summer declines.—That system is practically identical with their method of locating *meridian-noon* by the *shadow-well* in the centre of the south side of the Great Pyramid, as was astronomically tested to be true by Professor Smyth. That shadow-well appears like a door towards the left of the Great Pyramid, on page 70.

I have already shown that the Pyramid was a huge Gnomon or Sun-dial, designed to furnish "Time knowledge" to the Egyptians.

It is notable that Sun-dials are not found upon the old Egyptian monuments, nor are they referred to in their hieroglyphic records.

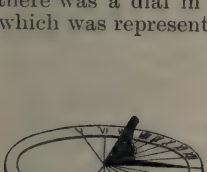
That absence seems to indicate that probably the Pyramid priests held to the larger pyramid and obelisk shadows, lest public use of the small numbered dial might let the slaves and common people "know too much," to the subversion of the priesthood's privileges and influence, for it seems fairly evident that the idea of the Sun-dial was evolved by the study of pyramid shadows in Egypt.

The "arris-ridges," as deflectors of the pyramid shadows, would suggest the smaller gnomons and sun-dial *styles* to the pyramid observers, who could hardly have been ignorant of their use, though having the pyramid, they did not need the smaller *styles*.

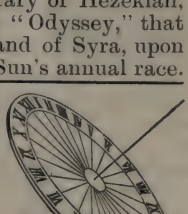
It is significant that one of the oldest sun-dials discovered at Pompeii was made for the Latitude of the ancient Egyptian city of Memphis, and had the identical *style angle* as developed at the adjoining Great Pyramid.

That is determined by the 30° Latitude angle of the style which must be parallel to the Earth's axis; then, as by the daily revolution the Sun daily appears between the East and West horizons of any given meridian, the ancient shadow *hour-lines* depending on the 24 hours rotation of the 360° of the Equator ($\frac{360°}{24}=15°$) falls at intervals of 15° per hour on each side of meridian (12) noon, until the semi-circle is completed by the 6-0 a.m. and 6-0 p.m. radii forming the dial's diameter at right-angles to the *style*, because the daily and annual motions of the earth are the astronomical facts from which sun-dials were invented.

SUN-DIALS are of very ancient date. The earliest mention of them occurs in the well-known incident recorded in Scripture of King Hezekiah, who, when sick and penitent, is granted, in miraculous evidence of the Lord's intention to restore him to health, that the shadow shall go backward ten degrees on the "sun-dial" of Ahaz. Homer, too (often supposed to be a contemporary of Hezekiah, about 700 B.C.), states in his "Odyssey," that there was a dial in the Island of Syra, upon which was represented the Sun's annual race.



HORIZONTAL (Local) with *style* (gnomon) casting 1-0 p.m. shadow.



EQUATORIAL (Universal) with *shadow-pin* inserted.

The above *horizontal Sun-dial* shows the shadow from the *gnomon* pointing to 1-0 p.m. at 15° East of meridian noon to indicate the *Time* (15° *per hour*), just as the Great Pyramid did to the ancient Egyptians, and still does, though now its fine pointed apex is missing.

At the Equator the complete dial circle is required because the Summer shadows would fall on the south semi-circle, and at the Autumnal Equinox change to the Winter shadows on the north side—both halves being bounded by the Equatorial line as the East to West diameter.—That Latitude being *nil*, the simplest *style* is a long *shadow-pin*, as inserted through the circle's centre of the *Equatorial Sun-dial* shown above.

OLD SHADOW METHODS of denoting TIME.

We have every reason to believe that the ancient Egyptians knew more of the African Equatorial regions than we do. They had commerce with the ancient civilizations, now evidenced by African travellers in the interior districts South of the Equator, and as *shadow-pins* inserted in the ground would be their surest and simplest means of finding the daily time and locating their position (Latitude) by noting the relative lengths of the daily shadows on their long, tedious journeys, it is possible the full dial circle was thus developed.

The *shadow pin*, though now almost obsolete, is still used by some navigators. I can distinctly remember seeing it used by intelligent English agricultural labourers less than 40 years ago, for my great-grandfather's use of a long iron *pin to find the time* for dinner, etc., when in the fields *without a watch*, early drew my attention to the use of shadows. Even now there are remnants of the agricultural labourers who by "shadow-pins" or a glance at the sun can tell the "Time of Day" within a few minutes of the true Time.

The facsimile of the two January pages of the "Travellers' Almanac" for 1712 A.D. (reproduced on the last page of the pink section), details the method of using the "Walking Staff" as a "Sun-dial" by reference to the seasonal lengths of shadows, which are tabulated *for each 5th day* at the top of each monthly part of that Almanac.

As the original Almanac from which that was taken is in my possession with several others, there cannot be any refutation of its proof, that our educated travelling ancestors regularly used and depended upon Shadow Staffs for their "Time of Day" during the early part of the last century. Further, this shadow method of finding the daily "Time" has unquestionably been continued in use by some of our agricultural labourers until now in remote districts, as was instanced last mid-summer whilst I was taking the local "shadow-grams" from my pyramid models.

My cousin, an agricultural labourer, came over, and seeing the π pyramid upon the diagram paper upon which I was marking off the sun-shadows about 8-30 a.m., at once said: "But you won't get *noon shadows* from that, it's too low." When asked how he knew that, he said that he had always been partly guided by sun-shadows, and at home knew whilst milking, when it was breakfast-time by the direction of the cow-house door jamb's shadow, and further, that the shadow from the lintel over the door-way at noon roughly indicated the Seasons of the Year by its inner distance from the threshold, and as that distance was long in winter and so short during mid-summer, he knew the π pyramid slope was too low to throw a noon shadow.

He, like myself, had been brought up amongst the poorest agricultural labourers, and so been trained in their plain reasoning methods as handed down by parental tuition through many generations.

I well remember that when a child it was my privilege to go to tea some Sundays with my great-grandfather, who greatly puzzled me by turning round and on looking at his shadow, saying, "it's tea-time." He teased me that way many times before telling me he knew the Time by the length and direction of his shadow.

In those days the labourers' clumsy watches were so scarce that they were handed down as heirlooms, and were so rare that old men in the fields still continued to locate their mealtimes and hours of labour by thrusting an iron rod or stick as a "*shadow-pin*" into the ground, and noting the direction of its shadow, after locating the south or meridian point, by "sighting" the church steeple.—which, by its angular out-line, served to show the general "bearing" or direction from which it was viewed. That was one of the reasons why our old village churches were generally placed in elevated positions, to ensure the steeple being seen above the trees.

We should not be justified in saying that the ancient Egyptians never used Sun-dials, for the one found at Pompeii was most probably taken from Egypt as a trophy of victory, just as victorious Romans, French, and ourselves later transported the much larger gnomonic obelisks to Rome, Paris, and London,—for Sun-dials were just those easily removed, useful memorials, which victorious generals and soldiers were most likely to carry away.

In many cases those Sun-dials were transported by persons ignorant of gnomonics, and when fixed in different Latitudes, were not true, *e.g.:* (1) The Memphis Dial found at Pompeii was nearly 11° wrong. (2) Valerius re-erected the Catania Sun-dial in the Forum at Rome about 261 B.C., yet, though Catania was 5° short of Rome's Latitude, the error was only discovered about 100 years later.

At any rate, no one will venture to deny that during the *middle ages* (say 500 A.D. to 1500 A.D.), and for about 200 years later, "Sun-dials" were the public instruments for recording by *Sun-shadows* the daily Time, not only in Europe, but right across the Old World to China, India, etc., where the old equal spaced, but uneven timed hours of the Sun-dial, remained in use until the clever Arabian, Abul-Hassan, about 1200 A.D., first introduced our *even* or *equinoxial* (clock) *hours*.

Sun-dials were formerly affixed to the outside south walls of most churches, or placed level on dial-stones near the entrance of others, to show the time to worshippers. Such dials still exist over the south-door entrances to many of our churches, as at *Thorp Arch*, near York. Their "mottoes" glorifying the Sun remind us of their origin in the ancient Egyptian eulogies to the Sun, and the old church authority in the apportionment of Time, as well as clerical control of the Almanac Festivals, etc.

Following the traditional habits of authority exercised by the Egyptian priesthood, the Greek and Roman Governments, mainly through their priests, took direct responsibility for, and proclaimed the Calendar Dates and Almanac Events periodically, as a guide to the right Seasons for agricultural operations.

We need only instance in pre-Christian times the great annual event of the Romans, in driving the "Yearly Nail" into the Temple of Minerva at Rome, to record the passing years—the term of which had been learnt from the earlier Greeks and Egyptians, whose priests regulated and proclaimed the public Festivals, *especially the advent of each Year.*

The Roman civilization, when later spread over Europe, brought with it part of the Egyptian sacred architecture, copied through the Greeks.

The name of our home, "Severus House," overlooking the conical funereal mound where the great Roman Emperor Severus was buried, reminds me that York was then the governmental centre of the vast Roman empire, hence we need not be surprised to find that within this city clear evidence exists of this connection between Church Government and the basis of the Public Almanac, in

The PORCH of ST. MARGARET'S CHURCH, Walmgate, YORK,

which bears the appearance of great antiquity.

The similarity of the arches of this porch to the Sun's monthly arches of elevation on page 16 is at once apparent.

Mr. Fenwick kindly reminds me that the eminent church historian, Mr. Drake, says:—

"It was brought from the Church of St. Nicholas, without Walmgate Bar, which was quite ruined in the siege of 1644.

"The arch is semi-circular, and in the outer circle, are the signs of the Zodiac very distinct, with other ornamental devices.

"In the inner circle are various ornaments which have every appearance of Egyptian Hieroglyphics."

The above I take to be perfectly impartial and independent testimony of the Egyptian origin of these signs, and also proof of that direct connection of the Church with the Almanac, which all history confirms as having formerly been controlled by the Church authorities,—then most emphatically comprising the learned men of their times.

Mr. Lerwick, the great antiquarian, in his observations on Ancient Churches, gives many British examples of Egyptian Hieroglyphics being introduced during the early ages into the ornamentation of Christian Churches, and says they were probably copied from the Romans, who had introduced the Egyptian mysteries of Isis into the empire, a fact which inclines us to believe that St. Margaret's porch is of very great antiquity, for identical stonework of undoubted Roman age is abundantly found in York.

As another instance, in the South, I may quote Dr. Littleton's letter on Saxon Architecture, where, speaking of the porch of Iffley Church, near Oxford, he says: "It is known to have been built near the end of the 12th Century. It has the twelve signs of the Zodiac, mixed with other emblems of a more fantastic kind." There are reasons for believing that this porch also was then rescued and removed from an older ruined sacred edifice.

Many more examples might be given of the close connection which has existed between public worship and the Calendar from the earliest Egyptian times until now; but the known history of the Almanac so fully establishes that connection, mainly through the Pontifical records, Pope Gregory's Reform, the irregular years of the early Roman Pontiffs, etc., that we need not labour that fact, which cannot be refuted.

The crucial point in that connection is, that the knowledge of the year's length and construction of the calendar *being regarded as of the highest possible value to men*, was held as sacred, and therefore centred in the greatest church authority.

That connection between Worship and Time Records appears in the light of my enquiry to have existed in the Old World, not only since the time of the Deluge (when the first Jewish records of longer time-unit countings than the *month* first began), but for long ages before in China and India, and longer still in Egypt.

(*Readers uninterested in Bible Ages, may pass to page 156.*)

THE DELUGE.

I only refer to the Deluge because it appears to have marked an epoch in the development of the Calendar of the Year and its Biblical History.

Prior to the Deluge, all is so vague that very many honest seekers after truth can only see in those ancient traditions mythical references, similar to those upon which the mythologies of the Greeks, etc., were built.

Up to that record, no clue is given as to Time records beyond the incredibly long lives of Methuselah, etc., which were evidently in lunations of the Moon, or months, as that was the only possible basis of long-Time-unit practicable for the earliest men, who, in course of years, wandered over immense tracts of country on the look-out for fresh natural pasturage for their ever-increasing flocks and herds.—*There is no mention of Times nor Places, which would only come into use after settled life in communities began.*

It is quite possible that those early wanderers may have strayed into and temporarily settled in the then unknown land of Egypt, and grazed their cattle along the fertile Nile valley.—If so, they could not know of the great annual Inundation which—coming down in gradually increasing volume until it attains an increased "Flood Height" of 25 ft. near Cairo (per Encyclopædia Britannica) was sure to overwhelm their encampment (naturally placed on rising ground) and drown their cattle, rendering escape alone possible by means of a boat.—For without actual experience, they would never have had the faintest idea of such a mighty Flood as the Nile develops, and further, no one after the terrible experience of such a Deluge would dream of settling there again, but give the place a "wide berth," until subsequent experience convinced men that those Floods were fairly regular and highly beneficial.

My reason for mentioning this is the most extraordinary resemblance between the record of the Flood and the facts of the Nile's Annual Inundation, compared below:—

RECORD of the DELUGE, as given in GENESIS.	NILE'S ANNUAL INUNDATION.
Chap. VII. v. 20, "Fifteen cubits (= **25 ft.**) upwards did the waters prevail."	**High Nile at Cairo rises 25 ft.** *(Encyclopædia Britannica, page 706.)*
Chap. VII. v. 24, "And the waters prevailed (rose) upon the earth **150 days**"	The Nile rises generally during 5 months = about **150 days.**
Chap. VIII. v. 3, "And the waters returned from off the earth continually, and after the end of **150 days** the waters were abated."	The Nile regularly falls during about 5 months = about **150 days.** ("Low Nile" only continues about 2 months.)

Those "150 DAY PERIODS" seem purposely emphasized and confirmed in detail, to mark the New Era.

Such wanderings into then unknown Egypt would obviously be by the Isthmus of Suez to Lower Egypt. From there the Ark or ship, floated on the Inundation waters, may have drifted out to sea, and so added to the terror of the inmates, who might ultimately land near some mountain South West of Gaza, or even as far North as Mount Carmel.

The first name, Ararat, may have been given to any of these, and its identity lost in antiquity. Probably ages later the remarkable outline of the top of the great Ararat was noticed by the sailors on the Caspian Sea to so closely resemble a ship, that they (having heard of the Deluge) would suggestively call that mountain "Ararat," just as the flat-topped mountain near the Cape of Good Hope was appropriately named Table Mountain. It is still usual to name newly discovered places by such characteristic features.

That particular Inundation, which brought dire calamity to those unwary wanderers, would be merely regarded, when spread over such a vast area, as an extraordinarily "High Nile" by the settled Egyptians of Upper Egypt, who consequently have no record of the so-called "Universal Deluge."

The survivors would seek safety far away from the Inundated area, and probably retrace their steps East, as that direction had a special attraction, *vide* the early Chapters of Genesis. Their descendants later spread through Asia would be over-awed by the traditional accounts of the Flood, which are recorded in Eastern sacred documents, and as the *month* was proved to be too short a measure of life, the next Era or "Long-Time-Unit" would almost certainly be counted in the 150 days unit, which so significantly denoted first the rise and then the fall of the Deluge, as explained on pink pages 7 to 10. Indeed, great emphasis seems to have been laid on the 150 days to establish that New Era basis.

The tell-tale admission, Genesis VII., v. 20, "15 cubits upwards did the waters prevail," which literally indicates the well-authenticated 25ft. Rise of High Nile near Cairo, points directly to the Nile's Inundation as one source of "The Deluge Story," whilst its 150 days' rise and fall, according with our experience of the Nile's Inundation, almost conclusively establishes that identical orig n.

Further, the original Hebrew word here used for the Ark is of Egyptian derivation; and the 30 days' months (clearly proved on pink page 8) agree with the Egyptian months.

Genesis VIII. v. 2, "The fountains of the Deep and the Windows of Heaven were stopped," seems a graphic description of the surging Nile waters poured down from the welling fountains of the Equatorial Lakes, whilst the cessation of rain would be a great relief, because the latter comes down very violently and does great damage when (as very rarely happens) rain falls in Egypt.

Thus *one* original account of the Deluge may have been naturally based upon an accidental experience of an ancient Nile Flood, as the facts and figures tabulated for the Deluge are nearly identical with those of the Nile's Annual Inundation.

In the year 1844, "Professor Lepsius discovered hieroglyphic inscriptions on rocks at the Cataract of Semneh, not far from the 2nd Cataract, showing that the Nile attained a much higher level in the time of Dynasties XII. and XIII., before B.C. 2,000. He gives the difference of mean water-level at Semneh as 7·30 metres, or 23·94 feet English. He observes that the whole level of Upper Nubia was anciently greater, and similarly that of Lower Nubia between the 1st and 2nd Cataracts, but that in this second tract the present level was attained since the time of Thothmes III. of Dynasty XVIII."

"Sir Gardner Wilkinson (the renowned Egyptologist) pursued the enquiry in a paper in which he argued that the cause of the change of level which he traced in the Upper Thebais was the breaking of the rocky barrier at Gebel-es-Silsileh, between Edfu and Assuan, where the low mountains on either side confine the river to a narrow channel" (Trans. R. Soc. Lit. N.S., IV.) ex *Encyclopædia Britannica*, Vol VII., p. 705.

As Lepsius dates the XIIth and XIIIth Dynasties as ruling Egypt between 2380 B.C. and 2136 B.C., we have the authentic date recorded as closely approximating the reputed time of the Deluge, 2349 B.C. (per Bible margin), most definitely combined with geological fact. Both were attested by the most eminent French Egyptologists, Lepsius, and the greatest British authority, Sir Gardner Wilkinson, who found that, prior to the Nile forcing that passage at Gebel-es-Silsileh, immense areas of Nubia were covered by the pent-up waters.

That passage would be burst, or greatly enlarged, when the pressure was greatest at High Nile, consequently the vastly increased volume thus released, would swell to such a mighty flood as may have overwhelmed Noah's contemporaries in Lower Egypt.

The devastating effect of such floods as we have read of in recent years are so appalling, that we need not wonder that,—owing to the then crude methods of expression so often re-copied, and constantly re-told respecting that calamity during over 4,000 years,—very exaggerated accounts of it have come down to us. The very widespread traditions of it, which exist in the sacred records of nearly all the ancient nationalities of the world, is sufficient evidence to us that it had at least some basis in fact.

In that other extremely ancient populous district round Babylon, Asshur and Nineveh, there has existed from the remotest times the most circumstantial tradition of a great Flood in that neighbourhood.

Geological facts also evidence that Chaldean Flood, which is attested by the present strongly marked physical characteristics of the surrounding country.

The Bible account, though exaggerated, seems founded upon the Nile's Inundation, combined with this occurrence of a great and protracted Chaldean Flood extending over the *area around the Caspian Sea*, the present level of which we know to be *about 84 ft. below the level of the ocean-connected Black Sea*, and it is unquestionably proved by the old shore levels that formerly the Caspian Sea level was that 84 ft. higher. *(Encyc. Brit.)*

We know that, though the Caspian Sea still covers about 180,000 square miles, it formerly extended over a vastly greater area, as proved by the surrounding low level salt-deserts, strewn with sea-shells identical with those still found in the Caspian Sea, and recent geological facts clearly prove that enormous volumes of water have been diverted from its basin. *The Sea of Aral to the North East and Dead Sea to the South West are also below Sea level, and still shrinking in area.*

Further, we know that the intervening region round Mount Ararat has been upheaved by volcanic action, indeed Ararat itself is an extinct volcano near the West end of that subterranean line of earthquake and volcanic weakness, which extends from Asia Minor along the South of the Caspian Sea, across Central Asia to the Pacific coast. *(Philips' Physical Atlas.)*

The elevated Elburz mountains, south of the Caspian, are composed of volcanic rock and covered with such (geologically) recent deposits as justify the belief that the surrounding area was upheaved about 4,000 years ago. That raising or severance of the Caspian Sea bed, would cause a protracted Flood which would take months to rise and discharge down that flat identical area (narrowing towards Babylon, drained by the Tigris and Euphrates), which is by common tradition (alike of the Mahomedan and other Asiatic religions, as well as the Christians), accepted as the cradle of the human race.

Possibly separate traditional accounts of the three great local Floods within the Egyptian, Chaldean, and Chinese areas may, through the subsequently intermittent communications of their great and most ancient peoples, have led an early writer with limited knowledge of the world, *to combine two or more of those stories into the one record*, which has been handed down to us, in the conscientious belief that they together evidenced a Universal Flood.

That was admittedly done with several parts of Genesis, which recent investigation and criticism of the world's greatest scholars proves were anciently interwoven from two distinctly original sources, as was traced by the variations in the duplicated parts, in one set of which "the Lord" is used, whilst in the corresponding set "Jehovah" is substituted.

Similarly, the words "God" and "Lord," as indicating two different original records, are used almost alternately through the Genesis VI. to IX. account of the Deluge.

We need not be surprised at that blending of two accounts, which the "15 cubits (25 ft.) upwards" record betrays, when we remember that the Egyptian, Chaldean, and Chinese nations alone seem to have then been sufficiently advanced to keep records, and their standard of exclusive civilization seems such as would lead them to ignore the mythic traditions of the other semi-barbaric races of whom they had knowledge.

The Great Chinese Flood is recorded (per *Century Dictionary*) as having occurred in the reign of the Emperor Yao, 2298 B.C.

"The Deluge" account in the Bible is dated, according to Bishop Usher's Chronology, as about - 2349 B.C.
but this date clearly goes too far back, as the short patriarchal "years" were counted as full years.

The Egyptian bursting of the rock holding up the great Nubian Lake is by inscription, etc., proved to have been somewhere about - 2300 B.C.

These dates, as recording the greatest authenticated Floods, are all so remarkably near to 2300 B.C., that when we consider the defects of Chronology, through parts of the periods being counted in 360, 365, or 365¼ days' Years and other minor errors, they must be admitted as signally confirming each other in fact and date, whilst they strongly confirm those widespread Floods, upon which the Bible account seems based.—*They all at least sufficiently approximate to warrant the belief that later men, having neither detailed records nor exact ideas of the intervening years, might, upon comparing two or more of those inflated traditional accounts, easily believe that those separate Floods occurred together at one great time of "Deluge," and so honestly write of it, with extravagant detail, when Genesis was first written, after about 1,000 years' traditions of those Floods.*

It is interesting to note that in centrally situated Chaldea, was erected the "*Tower of Babel*," which there is every reason to believe was the first Babylonian pyramid or high gnomon erected *to trace out the Seasons.*

"TOWER OF BABEL."

The "Tower of Babel" was no myth, as some would have us believe, but a serious reality, embodying the first united efforts of the Chaldeans, banded together in the essential task of pyramid building to seek out by Sun-shadows from nature's phenomena the vital knowledge as to the length of the Year, to promote their common welfare.

It is very important to note that, as in counting antedeluvian ages, months were called "years," there is no record of the word *month* in the Bible until after the Deluge, which seems to be generally, but erroneously, accepted as the cause of Babel being built as a "tower of refuge" from a possible future flood. The fact of its erection subsequent to "the Deluge" probably led to its being traditionally spoken of in that connection, as a ready refuge should further floods occur. But when we carefully read the preceding context in Genesis IX. 20, we note that "Noah began to be an husbandman" directly after the flood, whereas the "Tower of Babel" was built *over 100 years later,* when the locality had become thickly populated.

The following appropriate illustration of

The Ruins of
BIRS-NIMRUD, the reputed "TOWER OF BABEL,"
(ex Wm. Smith's Biblical Dictionary, published by John Murray, London,)

at Borsippa, near Babylon, is distinctly pyramidal in form with pillars upon its top, and raised above the surrounding plain for better tracing the Sun's course.—Though this may not be the actual "Tower of Babel," it shows the probable shape, and proves that the Chaldeans used pyramid observatories.

It was built of Sun-dried "bricks, and slime for mortar" (as described in Genesis XI.), into an oblique pyramid in 7 receding stages, *almost identical in style with that earliest Egyptian pyramid known as the "Step Pyramid of Sakkarah,"*

which was also built of similar bricks, etc., and dates from the 1st Egyptian Dynasty, who were urged to its erection by the "*mighty famine*" which is then emphatically recorded.

That identity of style and material used, seems to point to the conclusion that the earliest Chaldeans derived their first idea of pyramid building from the Egyptian "Step Pyramid," though it is possible that the Chaldeans independently discovered that most naturally suggestive pyramid method of seasonal research, which in pyramid and obelisk form was spontaneously established in Great Britain (at Silbury Hill), Central America (at Cholula), and other remote parts of the world, between which communication can hardly have been possible in pre-historic times.

The builders of the "Tower of Babel" were not afflicted with any hair-brained scheme "to reach the heavens"—that phrase is simply indicative of their high-flown methods of expressing height in early times.

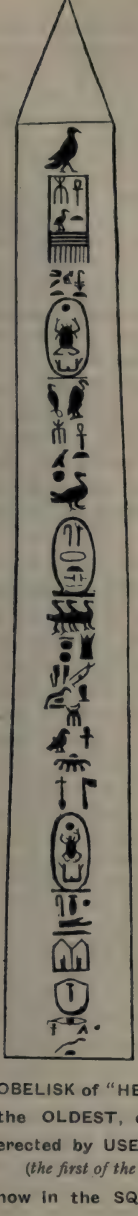
Our child's exclamation that the high trees on the top of the hill opposite our house "touch the sky," when seen with overhanging clouds, simply expresses in another way the same idea of great height, as viewed by a primitive mind without adequate knowledge of the immensity of space, such as the earliest men did not possess. Very few intelligent people can now grasp the idea of infinite space.

The builders of Babel were, however, intent upon discovering the length of the year, and hoped by watching the shadows of their pyramids and towers to discover that great "secret of the heavens," which in early transcripts may have been wrongly written "to reach the heavens."

Similarly, "*and let us make us a* name," in Genesis xi. 4, most probably meant "*make us a* nation," as that could best be done by cultivating agricultural pursuits which alone would enable large communities to live together, and obviate the wandering pastoral life of which they had become wearied.

Such differences were inevitable in early repeated transcripts,—often made by illiterate men, when the modes of expression were so limited, and subsequently varied and improved upon. The most that we ought fairly to expect is, that the general meaning of the original hieroglyphics would be maintained, as their limited number of signs necessitated some single signs being used to express many different shades of meaning, consequently we find that different readers of hieroglyphics seldom give identical translations.

This difficulty may be better appreciated by comparing the following illustration and translation of the Usertesen Obelisk, erected at "On" (Heliopolis) in Egypt, with the translation given by the more learned scholar on page 124—differences appear, but both express the same ideas in general.



Translation.

The Horus.

Living of Men.

Pharaoh.

Sun Presented to the World.

Lord of Upper and Lower Egypt.

The Living of Men.

Son of the Sun.

Usurtesen.

Lord of Spirits in Pone.

Ever-living.

Life of Men.
Resplendent Horus.

Good God.

Sun Presented to the World.

Who has begun the

Celebration of his two Assemblies *

to his Creator.

Life-giver for ever.

OBELISK of "HELIOPOLIS" (anciently called "ON"), the OLDEST, or "FATHER of OBELISKS," erected by USERTESEN I. of the XIIth DYNASTY *(the first of the really authenticated Rulers of Egypt)*, **now in the SQUARE of the LATERAN at ROME**

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* The double block hieroglyphic above, rendered "*Celebration of his two Assemblies*, should, I think, read "*Celebration of the two 30 Years' Cycles*," in accordance with the reference printed near the foot of page 124.

Since that was stereotyped, I have found that the "30 years' cycles" Usertesen referred to, were really periods of 360 or 365 "lunations" (months), called a "*Year of Moons*" which terminated with the *last moon* celebration, and practically equalled **30 Solar Years**, as authenticated by the inscriptions upon the monuments of the XIIth (Usertesen's) Dynasty. — *Vide* Osburn's "Monumental History of Egypt," Vol. II., page 9, which names this Festival "The Panegyry," *ex Rosetta, Greek, Vol. I., page 53, line 2.*

"TOWER OF BABEL."

The careful orientation of the Babylonian pyramids and pillar temples to the four points of the compass is strong confirmation of their astronomical use, which is supported by Diodorus, who recorded that the great tower surmounting the pyramid of Belus was thus used by the Chaldeans as an observatory.

Belus, otherwise called "Baal," was their "Sun-God," corresponding to the Egyptian Ra, and we all know that the most glorious title of the Shah of Persia (now ruler of Babylonian territory) is "The Sun of Suns."

All these indicate that the foremost thought and efforts of the early Chaldeans was to study the Sun to trace out the Year.

No other practical problem of life has ever so completely engrossed the minds of men as this one of "the length of the Year," which from the time the recurrence of the Seasons were first noticed, irresistibly absorbed the keenest interest of the most thoughtful men.

My conclusion, therefore, is, that soon after Noah and his descendants "began to sow seeds" they were forced by necessity to trace out the Sun's Seasonal Elevations as their obvious guide to the right season in which to sow their seeds, to ensure food for the rapidly increasing population, and (as explained in the pink "Bible Ages Section") it being practically certain that their eyes could not bear the intense sunlight which prevented direct watching of the Sun's seasonal changes in Elevation, they took the most natural course of fixing upon their Seasons by studying the shadows of pointed erections which, during the next 100 years, were ultimately developed into the pyramid form of gnomon (pointer of the Sun's motions), *of which the "Tower of Babel" was the first the Chaldeans built and recorded.*

As I expected to find almost throughout the world—all seem to have been compelled to follow the most obvious shadow-method, whilst those who ranged beyond monoliths as obelisks, and established high pyramids and cones, as the Egyptians, Chaldeans, Hindoos, Central Americans, Peruvians, and Ancient Britons did, were consequently far earlier than others in finding out the length of the Year.

Some varied from others in minor details (such as the pointed cone against the pyramid for shadows, or the truncated cone or pyramid with "sighting-staffs" erected thereon to save useless labour, where flints, etc., enabled the observer to shield his eyes when "sighting" the seasonal positions of the Sun to trace the Year); but, after all, the straight line from the eye past the top of the "staff" to the

Sun is only a direct method of locating the Sun's transit, which is hardly so reliable as the older method, which lets the Sun's rays strike the *direct shadow-line* from the pyramid apex to the *north shadow floor*, upon which the shadow's-length was most easily measured for record and future comparison.

That sloping line, as I have shown by Professor Smyth's verifications, determined the true pyramid slope in the Great Pyramid, but the indescribable difficulty which the untrained pyramid builders at Babel must inevitably have experienced in finding that prime essential to the success of their work, *would undoubtedly lead to differences of opinion, so deeply rooted and tenaciously held, that the resulting men of different schools of thought would hold to their views as vital to the successful solution of the Year problem they were all so ambitious to find, and develop such diverse cleavages in their ranks as would make their respective leaders resolve upon taking their own course and prosecuting their methods of research by pyramid-shadows in surrounding countries, as we find to be proved by both ancient history and old monuments, ruins of pyramids, cones, obelisks, etc., which are scattered throughout the world.*

It seems impossible to conceive of any other subject of debate like that of the SHAPE OF THE PROPOSED AMENDED PYRAMID, upon which men would be so liable to conscientiously disagree, and for which they would stake so much, when it was clear to all that the desired knowledge would enable their race to secure the most coveted knowledge, which could be applied to raise regular food to secure that long-desired security and settled life, as the longed for release from the uncertain wanderings and constant dread of famine, which had thus far burdened the lives of their ancestors and themselves, and appeared likely to more than proportionately increase in natural danger as their people became more numerous.

On the other hand, the security of their lives and property depended upon their securing a relatively greater increase of population to enjoy settled life, unmolested by the intrusions and depredations of the surrounding plundering and warlike tribes.

Those were the painful and anxious circumstances they had to face, and the more seriously the facts were considered, the more those Chaldeans would feel convinced that their best way out of that dangerous plight was to find out from the Sun's indications the lengths of the Seasons and the Year, by studying pyramid shadows, to settle the right times for sowing their grain, etc.

Human nature, being ruled by individual conviction formed under diverse phases of thought, was sure to develop very determined yet varied opinions amongst those hardy Chaldeans, who lived almost entirely in the open air; and those varying opinions as to whether the amended pyramid should be built in steps or rings (like Babel was), or be built to one smooth slope (like later pyramids were); and what the true slope's angle of inclination should be: would be so persistently discussed from both the theoretical view of the priests (who wanted a perfect Sun-shadow deflector), as well as the artisans (who wanted to avoid any unnecessary labour), that, in view of the intense and inherent difficulties of the Year problem already detailed, **there was ample ground for conscientious division of opinion as to the best style** of the amended pyramid they thought desirable, after they found that the "Tower of Babel" was defective.

We can quite imagine that one group of reasoners might blame the original designers of Babel for the defective "steps or terraces constituting its shape," which nullified the shadow measures during the Summer,—again, another more enlightened group might rightly argue that efforts to differentiate the diminishing Summer shadows were impracticable, and that the mid-way or Equinoxial slope was essential,—whilst opposed to these would be the supporters of the original method of building.

The contest for supremacy on these vital factors between the various factions would become so embittered by their knowledge of the far-reaching benefits which would result from a right solution, that we need not wonder that the growing cleavage of opinion naturally created those noisy and persistent wranglings with which the traditional name of "Babel" has always been associated.

The passionate tenacity with which groups of men have always held to the traditional Time-methods of their renowned ancestors, no doubt embittered those wranglings and accentuated the dissensions which split up the builders of Babel into opposing communities.

That conflict of opinion seems to have grown in intensity until finally it led to that notable dispersion referred to in Genesis xi. 9, "and from thence did the Lord scatter them abroad upon the face of all the earth."

I suggest that, just as later Abraham and Lot under like disagreement (recorded in Genesis xiii.), separated one to the *right* and the other to the *left*, so those Chaldean kinsmen of Babel separated to pursue unfettered the ideal season-searching method of their own group.

The different companies seemingly took divergent directions, and as the problem of the Year's length remained unsettled, part would probably continue to count their lives by the lunar months, part by the "Patriarchal Year" of 150 days, whilst more advanced companies may have used "longer-time-units."

The decidedly unstable chronological basis upon which the early dates of the Egyptian, Babylonian and early Bible Times are founded make accurate comparisons impossible, even for such noted Eras as that of "the Flood," because it is manifestly plain that on the one hand part of the Egyptian *contemporaneous kings* were wrongly chronicled in the scant records as *succeeding* each other, whilst on the other hand, the Israelites never applied the long year's length until the Exodus from Egypt,—a fact absolutely proved further on.

The Exodus, about 1491 B.C., begins the earliest fairly comparative date between the Bible and Egyptian records, because then the Israelitish records began to count time in the full 12-month years (as I have explained in the "Early Bible Ages Section"), whereas the patriarchal "year measures" for counting their lives had been:—

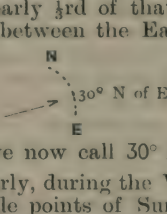
1 month from the CREATION to the DELUGE;
5 months from the Deluge to Jacob's Era;
6 months from Jacob's Era to the Exodus.

The "1 month" and "5 months'" Eras were reasonably explained, but how Jacob's "6 months' year" was found out could not with appreciation there be fully explained to unastronomical readers, who required to read the "Pyramid Section" before the strong probability of Jacob's "6 months' Era" would be apparent.—I therefore give that explanation more appropriately here, as its "Amplitude" method of research has been quite spontaneously used by many distinct races in different parts of the world during Ancient Times, to find out the Seasons and Solar Year.

It is desirable that we should bear the fact prominently in mind that when first the differences in Sunrise directions were ultimately noticed by different races, they would almost inevitably be attracted by the Sun's long and repeated rising over the extreme points of Amplitude, which mark the Summer and Winter Solstices respectively—consequently the period of Time between the Solstices would be their basis of reckoning. They would not think of the Equinox or mid-way point, when the Year-ends seemed marked naturally, though inexactly, by those extremes which denote the Solstices.

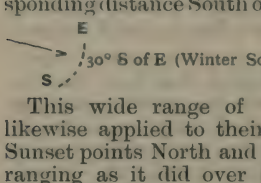
The dwellers on the plain of Shinar, where the "Tower of Babel" was built, would not be nearly so likely to notice the different seasonal positions of sunrise on the unbroken horizon as would Jacob during his 21 years' agreed service with Laban's flocks in the uplands of Padan-aram, where the outlines of the hills on the horizon would naturally mark and differentiate the Seasons by the direction of Sunrise appearing to alternate (in accordance with the Seasons) between the left and right sides of the eastern hills bounding the horizon.

There, during those weary years of service, Jacob's anxious nightly watching to protect his flocks from wild animals, etc., was daily relieved at dawn by the light of the rising Sun, for which he would intently look; and his active mind, when he had little else to think of, could hardly fail to notice that during the progress of the Sun's increasing Elevations towards Mid-Summer, the extreme points of Sunrise and Sunset (which we call "*Amplitude*," in degrees as they register *North or South of the true East and West Points*) appeared along nearly ⅓rd of that arc of the circular horizon between the East and North points,

thus — 

which we now call 30° North "Amplitude."

Similarly, during the Winter months, these Amplitude points of Sunrise veered a corresponding distance South of the true East point to



This wide range of "Amplitude," which likewise applied to their equivalent range of Sunset points North and South of true West—ranging as it did over ⅓rd of the horizon's semi-circle between North and South, would inevitably engross Jacob's attention, and soon convince him that the central point of those observations marked the true EAST :——>

whilst the observance of the Sun at that one point, which marked the sheep-breeding season, would locate his "6 month years."

That attraction for observing the East, and worshipping "*the dawn*" was characteristic of all the old religions, and dates back long before the Christian Era to the dawn of civilization; hence we rightly expect to find that the first idea of direction or compass pointing mentioned in Ancient Scriptures is the EAST (Genesis II. 14).

Nearly all the most ancient temples are thus orientated to the EAST, as the most constant point of Sunrise from which springs the ever-desired light and life of day. Our pointing of churches to the EAST is simply an inherited trend of most ancient customs which date back thousands of years before the time of Christ.—They point at once to the dawn of daylight and the dawn of civilization.

Eastra, from which *East* is derived, was the ancient goddess of *the dawn* and spring-time (dawn of the year).

The EAST is that one central point of the whole series of varying sunrises throughout the year, which from every locality marks the Sunrise at the Equinoxes, *when alone day and night are equal in length.*

Jacob fled to the EAST (Genesis XXIX. 1), had that direction as his objective when going for a wife, and the first controlling factor on his journey was the enforced night's rest at Bethel, "because the Sun was set." He, therefore, would be deeply impressed with the fact that the Sun ruled light, and accordingly became deeply interested in its apparent movements.

Most probably Jacob's first lot of stones were piled into a barricade or shelter, such as the fear of the wild animals inhabiting the wooded valleys, would naturally lead a solitary traveller to protect himself against, on the heights above.

Assuming he was thus protected, yet a little nervous, on this his first long distance journey all alone, he would obviously be watchful, and peeping through the holes between the probably circular stone barricade, might incidentally notice during the night, even whilst his head lay still, that any star observed through one loophole gradually disappeared and that others followed, whilst the whole mass appeared to be turning round like a moving dome, in the same direction as the hands of our clock.—If so, that would be a vastly more impressive revelation to him, than was my own accidental notice of the "Fixed Star" movements when gauged by the Holgate Windmill, for I was partially prepared to receive that impression, by having long had true knowledge of the physical motions of the earth, though not of the stars.

Such a discovery would imprint its importance upon Jacob's mind, and lead him to reason on the matter, and also induce him to return to that eminently suitable point of observation at a later time, as we know he did (Genesis XXXV. 7).

We should remember that, as I have pointed out in the pink "Bible Ages Section," the true Solar Year was not then likely to have been discovered by his ancestors, for Genesis I. 16, says: "And God made two great lights; the greater light to rule the day, and the lesser light to rule the night,—*he made the stars also*."

That reference to the stars seems almost put in as an after-thought hardly worth mentioning, whilst v. 14 noticeably states: "let them be for signs, and for seasons, and for *days*, and *years*."

It is *most significant* that the word *month* which was the period of the lesser light (moon) is not mentioned. The inference to be drawn from that omission seems to be, that the Solar Year was not then even suspected, and although crude ideas of the "growing," "fruit," etc., seasons prevailed, yet those early people inevitably counted their long periods by the "month," which was then called "year," as the first available long-time-unit.

Readers of the Bible Ages section (pink page 11) of this book may remember that I therein show reasons for my belief that after Noah, from the Era of the Flood down to the deaths of Abraham and Isaac, the lives of men were counted in "years" only 150 days long—based on the traditional length of the Flood (which may have been greatly exaggerated to enforce the acceptance of that "150 days' year," so conveniently counted as *5 months* of 30 days each on the 5 fingers of the hand)—*but that Jacob began to count his life in "6 month years," as the simplest possible method.*

The truth of this conclusion seems emphatically borne out by the fact that when Jacob's life in "years of 6 months" is re-measured in our 12 months' years, it then, as 72 years, rationally accords with the general known lengths of aged men's lives.

The well-known tradition (Genesis xxx. 37), "and Jacob took him *rods* of green-poplar, and of the hazel and chestnut tree, and pilled white strakes in them, and made the white appear which was in the rods. And he set the *rods* which he had pilled before the flocks, etc.," may well have arisen through Jacob, in his study of the Sun and Star motions, *staking off* from his fixed point of view (during his lonely watching of the flocks) the seasonal points of Sunrise and Sunset (Amplitude).

The divine origin of this traditional record of the incident of the rods (which Atheists sometimes call the "stake trick"), has often been questioned on the ground of the evident fraud Jacob practised upon Laban; whilst Christians have urged that if Jacob had relied upon complete faith in God, there would have been no need whatever to resort to such questionable means, moreover, the pure divine revelation was never intended to encourage men to resort to such questionable means.

No doubt at first the term, East, simply meant the *general direction of Sunrise* (which varies about ⅓rd of the quadrant points North and South), without any precise knowledge of the true East point, which it seems probable that Jacob located by means of "sighting" his "ring-straked, etc., rods," purposely staked out to mark the Seasonal Sunrises.—Then continuous close watching of the Sunrise change-points along those stakes during a few of the Solar Years, would convince Jacob that the Sunrise marked the true *East* at the Equinoxes about every 6 months or 183 days.

On finding the Autumnal Equinox to be the ideal time for mating his flocks, he would watch for it more closely, and could not fail to see that the year's-end could be far more accurately measured at the Equinoxes than the Solstices, because, as I have already pointed out, at the Equinoxes the Sun's inter-day change of Amplitude is about 180 times greater than at the Solstices.

The finding of that 6 months' period or year-point which was marked by the line of his central and mid-arc stakes, would be regarded as a great and valuable discovery, especially when by it he found that those alternate true East (Equinoxial) Sunrises registered the best times for serving his flocks of goats and sheep with rams to secure the best increase.

We may therefore rest fairly certain that Jacob, during those 21 years when unfettered by family rules, relying upon his own resources, and seeking knowledge in his own way, would see that this East or Equinoxial mark recurring about every 6 months, was the only reliable marking period or "year" of 6 months upon which he could depend, because experience proved that the extreme North and South variations at the Solstices could not be located to a few days.—(*The very term, Solstice, means that the Sun appears to stand still or stop in its declination.*)

It was a much more easily recorded "year" than the "5 months' (150 days) year" of his fathers, which needed tedious daily counting, whereas his new, simple "sighting stake" method of recording both the breeding times and his own "years" of life, merely required noting down once in about 180 days, when the Sun rose in line with his two due East stakes; hence, as in the evolution of progress men always adopt the "shortest cut" or easiest course, and "join the least-trouble-society," Jacob adopted the far easier and truer course of counting his "years" as those stake registered Equinoxial periods of 6 months, which we should call the 6 months or ½ years (Summer and Winter) of our year.

Jacob, by studying the Seasons, etc., became expert as a breeder of cattle, sheep, and goats, which probably up to that time had merely been mated on chance meetings, led by instinct.—Jacob's systematic investigations of the Seasons by "sighting rods" had enabled him to vastly increase Laban's flocks, yet (like most employers of labour) Laban was willing to take nearly all and give very little reward to Jacob, who rightly expected better return for his splendid services, and was prepared to fight for his rights whenever opportunity arose.

Hence arose the dissatisfied feeling which caused Jacob to withhold his seasonal and breeding knowledge from Laban and his people, who seeing the mysterious staffs set up by Jacob, erroneously assumed and handed down the tradition, that those so-called "divining rods" had a direct influence upon the colouring of the young when the mothers conceived within sight of the "rods."

That mistaken part of the story would not be denied by Jacob—whose secret purpose was thereby helped. He was "too cute" to let his hard won knowledge be used by others, to deprive himself and family of the surest means by which he knew they might become the "great nation" he so ardently desired.

Jacob had that keen business insight, naturally blended with the subtle craft and reticence which have always characterised the descendants of Israel, who became a great nation by cultivating his principles.—Indeed, the unexampled commercial success of the scattered Jews of to-day may be mainly attributed to their transmitted blood being derived from Jacob, and his ancestral example of persistent determination to get rich being inculcated into young Jewish minds.

It seems as though the dawn of the then new idea to herdsmen, that young cattle generally partook of the markings of the *male* parent, was traditionally described as having been disclosed to Jacob *in a dream*, because through his keen interest in breeding, he first noticed that the progeny of the most vigorous rams predominated over the characteristic markings and vigour of even the mothers, who until then had naturally seemed to have far closer and more complete control over the distinguishing features of their young, which during the months of gestation were united by the closest possible ties with the mother's whole being.

That remarkable *contradiction of nature* is still the great secret of success in cattle-breeding, as proved by the recent sale of Lincoln rams, one of which realized £1,000, when ordinary ewes were sold for £3. Correspondingly high prices are paid for high quality vigorous males of horses and cattle as a rational commercial expenditure for breeding purposes; hence we need not be surprised that the origin of that knowledge (which was so exceptionally valuable in those pastoral ages) was so highly prized and kept secret, when flocks almost solely represented the trading value and riches which all were trying to secure.—That secret knowledge was far more valuable to him in those pastoral days than the possession of a gold mine, and the scripture record shows that he systematized and made full use of that newly acquired insight into nature's law; which enabled him to reap the reward for his patient research.

Having, probably by isolating the breeding from beautifully marked males, first exclusively noticed the consequent markings of the young, and deduced by experience that unexpected law of nature, Jacob could play "heads I win, tails you lose" with whatever arrangement Laban might agree to, when based upon the marks on the young animals, as the sequel showed; because Laban ignorantly thought the marking was directly controlled by God, instead of God controlling through nature's laws.

JACOB seeks KNOWLEDGE to advance SELF-INTEREST.

Strange as the foregoing may at first appear to the reader it is none the less true, as proved below, that Jacob had to discover the "6 months' year," to more quickly increase his flocks and achieve his great ambition for prosperity and power, to thereby establish his family in knowledge, wealth, and influence, so that they might become the great nation which later, as Israelites, spread his fame all over the world.

We know that in Jacob's time wealth was mainly represented by sheep and goats, therefore knowledge of the principles which governed the breeding of flocks and herds was of the greatest importance, as if he could (as he actually did) find out how to get two crops of lambs and kids every year, he could become rich and powerful twice as fast as anyone else so long as he kept his secret, because his advantage would increase in more than double ratio each year; thus whilst the flocks of others increased as ... 1 2 3 4 5 6 7
Jacob could multiply
his faster, as 2 4 8 16 32 64 128.

We may frankly admit that Laban's knowledge about the increase of his flocks did not exceed that of the South American sheep breeders, as evidenced by the following letter received from Mr. Hinde (through his son), whose statement can be relied upon, as Mr. Hinde is well known as a life-long student of nature, and a gentleman of undoubted veracity:—

"24, Avondale Road,
"Croydon: *May 13th*, 1902.

"Respecting your enquiry about sheep-
"breeding in Buenos Ayres, you can tell Mr.
"Cotsworth that it was carried on in a very
"primitive style when I was there thirty years
"since. The rams are allowed to remain with
"the flocks all the year round, and no attempt
"was made to restrict the period of lambing.
"But though lambs would appear sporadically
"all the year round, there were TWO SEASONS
"when the PRINCIPAL LAMBING TOOK PLACE,
"ONE IN APRIL AND MAY (the Autumn there)
"and the other in August and September (their
"early Spring). The Autumn lambing was
"generally the largest, and was preferred so,
"for the lambs would flourish better than those
"born in the Spring.

"I do not think the ewes ever brought up
"more than a single offspring in the year (or
"perhaps twins), *but if they chanced to lose*
"*their lambs by storms or other accidents in*
"*the Autumn period, they would be likely to*
"*produce again in the Spring following.*"

I would particularly direct the reader's attention to the last sentence, as it is most suggestive; for all human experience evidences the fact that mothers are not likely to have further offspring whilst they continue to thus suckle their young.—That is one of the chief reasons why poor mothers suckle their children so long, at the expense of their own vital force.

That factor is also largely true of vegetable life. The potato growers of Jersey, France, etc., the vegetable growers of the Riviera, Italy, Egypt, etc, could not get TWO CROPS PER YEAR as they do, if they allowed the roots of the first crop to remain neglected in the ground, AND DID NOT PROMPTLY AND RIGIDLY OBSERVE THE SEASONS, as men must do to increase natural productiveness, by helping nature beyond the limits of wild neglect.

The sheep in Buenos Ayres, like those of America, Australia, Africa, Asia, and Europe, will never produce a tithe of the food they could form for men, so long as the lambs are left to suckle the mothers' energies till full grown: but if they are separated and provided for in the way Jacob discovered, the production of meat can be enormously increased to bring untold blessings to millions of poor families, if they will rationally think and act for themselves, and in self-defence remove the greedy Trust-mongers who seek to become rich at the expense of the food supply of their unfortunate toiling fellows.

Men like Leiter, Pierpont Morgan and others, who create "corners" in wheat, beef, etc., seem guilty of perpetrating upon humanity frauds which seem far more heinous as crimes than the hasty actions of those who take life in passion; as the "Trusts" and "Corners" inflict far more suffering upon the innocent, hard-working and deserving poor, without conferring any adequate advantage. Whatever good such men may think they can do, will be far more than counterbalanced by the loss to humanity which monopoly would cause by crushing out the hope of individuals who now so strenuously labour to rise by their own exertions and reap the fruits of their labours.

All the economies Trusts can coerce by unjustly crushing small business men, could without injustice be far better effected by Co-operation, and after all, if the Trusts could "*gain the whole world*" they would not collectively do as much good to humanity as the little-known, poor *Tees-side man who invented matches*, or Jacob, who observed and studied during so many years to increase the breeding of cattle. —That may seem an astonishing statement to make, but I will now proceed to prove it.

I need not multiply proofs beyond Mr. Hinde's terse letter to establish the fact that the present neglect in breeding sheep, etc., is a discredit to our 20th Century civilization almost throughout the world; but I must prove how the number of sheep, etc., could by using Jacob's "6 months' year," be increased for our yearly food.

To that end the impartial evidence of Mr. Rider Haggard (with whom I have never communicated, and who has no idea that this work is being written) establishes my argument, that if the lambs are taken from the ewes in time and prompt advantage of Almanac knowledge be taken to turn the rams into the flocks at the two right times each year, and feed them well, we can thereby obtain TWO CROPS OF LAMBS EACH YEAR. In the following

years the ewes of those lambs can likewise be made to duplicate their offsprings, which would thus go on increasing in double ratio till the fullest requirements are met for all peoples.

Mr. Rider Haggard, during his investigations into the decadence of English agriculture, as reported in the *London Daily Express* for June 13th, 1901, in the "Back to the Land" article, respecting his visit to the borders of Wiltshire, says:—"The next farm we visited was that of "Mr. Ferris, of Upper Salthrop, who farms "400 acres, half arable half pasture, and "complained much of the lack of labour.

"Mr. Ferris has a flock of *Dorset Horn* "*Sheep*, and told me what, oddly enough, I "never learned when in their country, although "I saw many of them there, that these sheep will "produce two crops of lambs a year, *if well kept*, "one about MARCH and one about OCTOBER, of "which a large proportion should be twins."

That statement of fact is clear enough, and made without any ulterior object. But whilst Mr. Haggard was surprised to find the fact, I was not in the least surprised, because as a matter of fact I had known that from my youth, when my grandfather (by whom I was brought up), who had been a shepherd all his life, confided to me his secret, and told me how double crops of lambs each year could be obtained. Had he been able to earn sufficient money to convey himself and family to the Colonies, he intended to apply that secret to sheep-breeding on his own account to make a fortune. But though industrious and careful, his wages left him no margin, so he was tempted by the higher wages of town-life to try to earn money by which he might emigrate, but he was ruined by the higher expenses of town-living, his health broke down, and I had him largely to support.

It was then that he told me his *secret, advising me strongly not to tell anyone, or its value to me personally would be gone*, whereas if I could earn sufficient money to use it in Australia or elsewhere abroad, a fortune would result to me, if I could do it quietly and unknown sufficiently long to get a good start before competitors learn my secret, —just as Jacob appears to have done.

Had that secret been recorded in this book without local and impartial evidence the newspapers would have ridiculed my assertion; but long before Mr. Haggard's letter appeared I had verified that secret in Egypt and Syria.

Though I have not communicated with Captain Flowers since my visit to the Gizeh (Cairo) Zoological Gardens for that purpose, I feel sure that he, as the courteous Superintendent appointed by the Egyptian Government (whose zoological collection is the best in the East), will remember how, as an entire stranger to him, in Nov., 1900, I astonished him with the curious question, as to whether he could tell me if he had noticed any of their sheep having lambs a second time in the year. He replied that they had such a case, which had greatly puzzled him, and forthwith took me out to see both the Astrakhan sheep and its lamb of the second crop in that year.

I noticed that the curly Astrakhan circlet which grows as a thickening of the fleece round the lamb's neck, was not nearly so curly as the Astrakhan worn for collarettes, etc., by ladies and gentlemen, so I asked Captain Flowers whether the commercial article was manipulated and specially curled for trade purposes. He at once replied: "No! "*The Astrakhan of commerce can only be* "*obtained by killing both the ewe and its* "*lamb before the lamb is born*, as the true "curl is only found upon the lamb some time "*before it is born*, because the curls gradually "unfold as the time approaches for the lamb "to be born, so that the skins of those which "remain alive to see daylight are not good "enough for the votaries of fashion."

I never paid much heed to the vagaries of fashion, but after that true explanation (whilst looking at the little lamb with its scarcely curled but natural doubly thick necklet) I determined never to wear Astrakhan, which would always remind me of that murderous cruel practice which must have done much to develop cruelty and hardness of heart in the Astrakhan Districts, whilst the consequent loss of needed food to the poor can hardly be estimated when we think of the appalling restriction of production which the slaughter of both mother and lamb entail.

Captain Flowers then asked where I came from, and on my replying York, he stated that he had a sister there named Mrs. Shann, whom I at once said was the wife of our family Doctor. Knowing that Mrs. Shann was cousin to Major-General Powell, who was then so gallantly defending Mafeking, we naturally spoke of the lively general's exploits.

Captain Flowers then asked me what led to my unusal interest in sheep? And on my replying that it was mainly connected with my solution of the Ages of Early Men in the Bible as disclosed by my Almanac and Pyramid investigations, to verify which I had travelled to Cairo, he surprised me by saying that his uncle had spent his best energies on the Pyramid problem. On my asking who that was, he replied "Professor Piazzi Smyth," whom I had been privileged to frequently interview during his fatal illness, and most of whose Pyramid relics, books, etc., I had bought at the sale of the late Professor's effects only a few days before I left for Egypt.

These facts and mutual interest in the late Professor Smyth, who had done so much for Astronomy, Stereoscopic Work and Photography (I have some of his Pyramid negatives dated 1865 on one-inch plates, which when enlarged to full-plate size are almost equal to any full-plate photographs taken this nearly forty years since), led Captain Flowers to invite me to lunch, after which we had a most interesting conversation which we were loth to conclude when time compelled me to leave.

The unusual circumstances connected with that interview will recall these facts to the memory of Captain Flowers, even though he is constantly receiving so many visitors.

When later journeying through Syria I noticed how many poor families fed their pet sheep with mulberry leaves, etc., by hand until it was fat, and then killed and preserved it cured in jars for their year's supply of meat, as our cottagers now cure their pigs.

It would have touched the heart of any thoughtful man to witness the high glee with which Syrian children looked forward to the taste of meat, and how hungrily they devoured scraps offered to them. Their greatest wonder was to think how we in England could get meat every day in the year. They could hardly believe that we could get meat to eat daily. Then it was that I thought it was high time we applied true Almanac knowledge to the principle of Jacob's sheep-breeding, to help such poor people and, instead of selfishly restricting that benefit to self as Jacob did, let that increased blessing extend in goodwill to all. *Self interest and money-making should be considered less and the greater interests of humanity far more.*

My interest in sheep led to closer enquiries in Syria and Palestine, where I found odd autumn lambs near Beyrout along the Dog River, near Zahleh and Baalbeck (midway between Beyrout and Damascus, in the well-watered valley between the Lebanon and Anti-Lebanon Mountains) and South of Hebron, but was told that they would have been found more plentiful in the well-watered plains East of Damascus and the richer grass lands of the Jordan Valley, especially if the sheep had been braced up and invigorated during the hot summer by grazing upon the adjoining mountains, where Jacob probably led his sheep. I was not able to bear the expense of special journeys there, and had not the time to spare; but during our travels in those early days of December, 1900, we found many groups of goats with their little flocks of autumn kids, from two to three months old, especially one very fine flock of kids at the sources of the Jordan.

Had it not been that I was stranded in quarantine at Beyrout, and there had the good fortune to meet Professor Wright, of Oberlin University, U.S.A.; his son, Mr. Frederick Wright, and Mr. Scott, of Boston, U.S.A., and was privileged to join their party as the best way out of my difficulty, I should not have been able to have traversed Palestine as my best way home; I therefore had to follow their route, and so come through the centre of the Holy Land, for in view of their great courtesy in allowing me to join them I could not think of advocating the Jordan route, where my interest lay; but they most obligingly met my wishes to slightly divert the route by Shiloh, to note and let me take a photograph of the Pyramid style of Observatory the Israelites erected at that first place where they pitched the "Ark" when they entered the promised land, and where the Priests remained with the Ark until the beautiful Temple was later built by Solomon at Jerusalem.

A brief rest at Bethel enabled me to realize the advantages of its very suggestive position for *sighting* the course of the Sun, Moon and Stars as they would appear to Jacob, who there had a magnificent view of the distant Horizon, especially towards the sunrise, as Bethel stands on the brow of the hill from which the view extends clear over the wide Jordan Valley. *I attach considerable importance to the fact that on the higher ground, North of the Village, stands the remains of a Gilgal or Ancient Circle of Observatory Stones.* Unfortunately the Sun had just set so I could not take a photograph nor stay over-night that Christmas Eve, as we had to press on to Jerusalem.

Another interesting diversion was accorded when we went round by GILGAL, and started before 5-0 a.m. to see that glorious sunrise which we shall never forget, as the sun rose so clearly defined near the Winter Solstice point adjoining Mount Nebo. There the daily gradations of sunrise points could be plainly differentiated upon the almost mathematical quadrant shaped curve of the mountain ridges there bounding the horizon beyond Jordan.

The whole scene formed a most ideal natural observatory site, as from GILGAL (which suitably stands on an elevation), the whole level plain of Jordan delta-like extends for nearly twenty miles, to the sunrise sighting points which could be so admirably differentiated upon the distant serrated ridges of Moab and the Huran.

It was there easy for me to understand, as I pointed out to my companions, why GILGAL was chosen for the first camping ground or seat of the Israelitish Government, who required to observe the Seasons, after crossing the Jordan in the easy way they could upon the sandbars which always form as convenient "fords" where the turbid waters of Jordan's flowing stream deposit their sandy sediment, when the current is so suddenly checked by the resistance of the heavier stagnant water of the Dead Sea.

The same kind of sand-bar ford is formed by the deposits of the Upper Jordan's muddy stream as it enters the still water of the SEA OF GALILEE, where we obtained a splendid photograph of a laden camel crossing, and also saw men, women and children cross with other animals, just as I believe the Israelites so easily crossed the Jordan when the ford was opposite Gilgal, where they naturally encamped to safeguard their line of communications (and retreat) across the sand-bar.

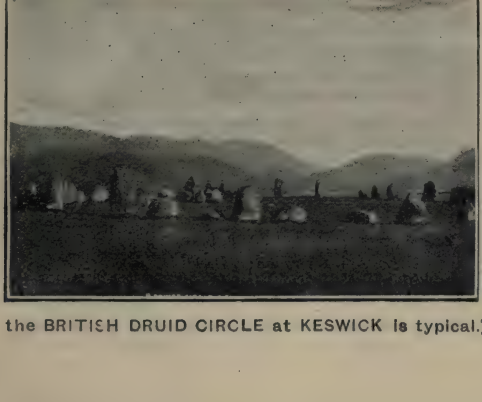
The traffic of the numerous Israelites over the Gilgal Ford no doubt made it firmer and harder as it became the road to and from the great corn growing districts East of Jordan, hence it is still maintained. But as the water of the Dead Sea gradually reduced and receded South (as both history and undeniable geological evidence proves it has done), the Sand-bar Ford of the delta of the Jordan was drifted southwards by Jordan's stream, so that now it is about thirteen miles South of Gilgal.

The Israelites having adopted the "12 months' year" and "12 hours' day" from the Egyptians, had to erect a simple Observatory for Government purposes in arranging times for Court Ceremonies, Judgments, Hours of Labour, Rest, Mealtimes for the Army, etc. For that purpose they required twelve stones to mark the twelve hours of the day. These twelve stones pitched in Gilgal as per Joshua iv. 19-24, would not be smaller than a horse's head, or the inhabitants might have used them to ballast their tents against the wind, as the Arabs do,—nor would they be larger than could be carried or rolled into position, for the Seasonal change in the Amplitude of Sunrise would necessitate the monthly adjustment of all these stones, except the noon-recorder and centre stone, which would be the only two remaining in fixed positions throughout all the Seasons, or the 12 Mid-Summer hours would be nearly twice as long as the Mid-Winter hours, when counted from Sunrise to Sunset.

We may reasonably infer that Gilgal was used as a National Observatory directed by the priests, when we remember that Gilgal continued to be the seat of Government and Priesthood for over 500 years, and that here :—

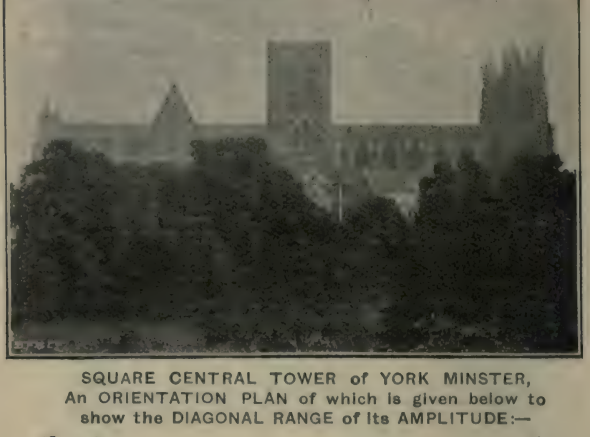
1. The first Canaan Passover was held. Jos. v. 10.
2. Treaty was made with the Gibeonites. Jos. ix. 6.
3. Joshua divided Canaan and gave Caleb Hebron..... Jos. xiv. 6.
4. Israelites chided for not throwing down the altars of the Canaanites. Judges ii. 1.
5. Samuel Yearly Judged Israel. 1 Sam. vii. 16.
6. Samuel chose Saul, who was proclaimed King after he had been up to the "High Place," or Observatory Altar at Gilgal. 1 Sam. xi. 14.
7. David was acknowledged King. 2 Sam. xix. 15.
8. Elijah and Elisha started hence on Elijah's last journey .....2 Kings ii. 1.

I therefore believe that this ancient Gilgal was used like other Gilgals in Europe, Arabia, India, China, America and Africa, which we recognise as Druidical or "Sun Circles" like Stonehenge. Of the more primitive stone circles

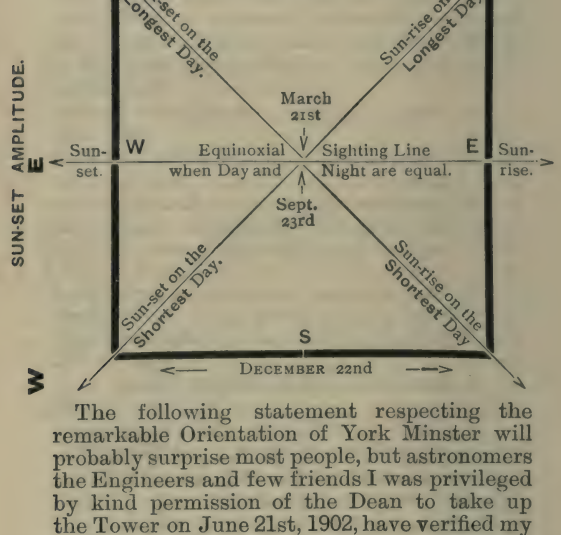


the BRITISH DRUID CIRCLE at KESWICK is typical.

The earlier simple method of observation used by Jacob can perhaps be best exemplified by the



SQUARE CENTRAL TOWER of YORK MINSTER,
An ORIENTATION PLAN of which is given below to show the DIAGONAL RANGE of its AMPLITUDE:—



The following statement respecting the remarkable Orientation of York Minster will probably surprise most people, but astronomers the Engineers and few friends I was privileged by kind permission of the Dean to take up the Tower on June 21st, 1902, have verified my prior tests which had extended over the three previous years at each of the four *natural* "Quarter Dates," December 22nd, March 21st, June 21st, and September 23rd.

I can therefore vouch for the following essential "amplitude" facts for York:—

W.—At the WINTER SOLSTICE on DEC. 22nd —the SHORTEST Day—the Sun *rises* over the S.E. corner, and *sets* over the S.W. corner.

E.—At the EQUINOXES, when Day and Night are equal on MARCH 21st and SEPT. 23rd,—the Sun *rises* over the Centre of the East Window, and *sets* between the two West Towers.

S.—At the SUMMER SOLSTICE, JUNE 21st—the LONGEST Day—the Sun *rises* over the N.E. corner, and clearly *sets* over the N.W. corner point.

The WINTER SOLSTICE or YULETIDE on DECEMBER 22nd is placed first as the natural year's starting point, to which any universal Almanac will ultimately have to revert in order to become acceptable to all races and creeds.

That starting point naturally appealed to the Druids, etc., because as the Sun daily rises each hour up to noon and then falls to sunset, so its elevation daily increases from the Winter Solstice to the Summer Solstice and then falls to the year's end at the Winter Solstice.

The broad ruled square represents the walls of the truly built SQUARE TOWER, and the letters N.E.W.S. denote the four points of the compass, which when read in the old style, N for North first, then E to the right before W to the left (we still say "East and West" though we read words from left to right) and finally S for South, literally express the word "News," which was thus derived from the first "news sheet" published, which showed the news from the four directions in their respective quarters of the earlier printed square "sheets of news." These printed sheets subsequently developed into our newspapers.

The signs **W.E.S.** denote the sunset points as outlined upon the horizon by the "Amplitude Sighting Method" at the Solstices and Equinoxes. They correspond to the W.E.S. points of the Sun's highest (noon) elevations when the Seasons were inversely measured by the "Pyramid or *Shadow* Method," upon the *Meridian*, as per page 38.

The essential Meridian point of Sun, Moon and Star observation is still maintained, but now that we have such splendid astronomical telescopes, etc., fitted with coloured glass through which the eye can mark the Sun's elevation at noon, we through them apply the *direct sighting method* at our National Observatories to fix upon true noon, and thereby keep our clocks, watches, etc., adjusted to the Sun's apparent movements as the true and natural basis of Time.

The Ancient Druids, like Jacob, could only at first use the "amplitude method," and as the site of York Minster is on the highest ground in the midst of the great "plain of York," which extends for many miles in every direction, it was an almost ideal position for their Observatory, especially as the River Ouse flowed conveniently by and afforded a natural channel for Trade, water, fishing, etc.

That I believe led to the raised ground about the Minster being regarded as a "Sacred Site," which naturally led the pious men of olden times to successively erect thereon, Observatory Stones, Altars, Saxon, Norman, and Gothic Places of Worship, until the present grandly proportioned Minster was completed.

Belief in that is confirmed by the fact that the square foundations are all twisted round 1° 20′ from true North, as proved by exact angular measurements taken by telescope directed Theodolites, at the four orientation points of the Compass to get that refined seasonal accuracy which could not be detected by the eye.

The reason for that twist is very simple, for as the Valley of the Ouse when viewed from the centre of the Minster Tower appears across the N.W. corner at *Sunset* on the Longest Day (when clearly the best yearly observation could be taken), the Sun disappears farther North than is mathematically true, because the ground level near the river banks is about 2° lower than the Yorkshire Wolds which intervene above the comparative level across the N.E. corner, so delaying the view of *Sunrise* till the Sun is about 2° higher.

But the interesting fact remains that on the Longest and Shortest Days the Sunrise and Sunset points at York appear in the direction of the diagonals of a truly orientated square, and as the Astronomical reasoning of early men was inevitably based upon geometrical arguments, I submit that it was most natural that the Druids should be attracted to the Minster Site by that remarkable coincidence which they would regard as of mysterious import and most convenient for observation, etc.

Further, the traditions connected with that ancient sacred Observatory site naturally led successive Architects to build and preserve the Tower's peculiar level uncapped corners without ornamentation, to maintain an uninterrupted view of the Sunrise and Sunset "Amplitude" points.

The story that the early founders intended to complete the Tower by adding a Spire, but found their foundations too weak, will not bear investigation, as evidence of the strength of ancient foundations convinces us that ancient architects rather erred on the side of undue strength of their foundations. After having seen the oldest foundations at York, Rome, the Great Egyptian Pyramids, the marvellously massive foundations of the Baalbeck Sun Temple with its several hewn stones of about 1,000 tons each, and hardly regarding the ancient British "Arrows" (near Boroughbridge), which even now-a-days would tax the united energies of York Corporation to remove—I cannot believe a tale like that.

Now whilst the square diagonal "Amplitudes" at the Solstices are true of York and as far North as Durham (where like factors also led to the square blunt Tower, which excludes corner pinnacles), they are not true of lower Latitudes, and as a matter of fact would only range rather more than half that right-angular distance between those half-yearly seasons marked by the Longest and Shortest Day in Syria, where Jacob therefore experienced far greater difficulty in locating his "Half-yearly Amplitudes," because there was no such diagonal coincidence applicable there as an easy geometrical figure to help him.

As the angular width of "Amplitude" approximately decreases with the Latitude, the wide range at York's 54° is greatly reduced at Padan Aram or Damascus, where the Latitude is below 34°; therefore Jacob had to daily

observe the Sunrise "Amplitudes" which were only apparent in much smaller gradations and became so minute at the Solstices, that he could not then detect daily differences, though he would no doubt attempt to do so for the first few years after he became anxious to time his sheep breeding seasons more exactly, by erecting and "sighting" suitably marked *sighting-stakes* towards the *Eastern horizon* to register the extreme "Amplitudes of Sunrise."

Jacob's enquiring mind would almost inevitably lead him to count the days between his observations, by cuts or notches on a handy stick he would carry whilst wandering with his flocks, as that was obviously the most primitive Almanac device.

Most readers will naturally think that that would be easy to do. I thought so until repeated attempts convinced me that by reasoning on natural lines without applying current Almanac knowledge it would have taken me into "teens" of years to approximate the 365 days' year, and even at the end of that time any impartial observer, who had not the advantage of prior acquired knowledge imparted by books or men, could not be sure whether the year was 364, 365, or 366 days long.

That is partly due to the fact that the sunrise points take about a day longer to travel from the Longest Day's amplitude at **S,** to **W** its *Shortest Day* point, than it takes to go back from **W** to **S,** therefore early men could not tell which was right; indeed they could not detect the difference between the two by the "Amplitude Method," because the sun appears to stand still a few days at each point, and as the actual solstice moment varies each year throughout all the twenty-four hours of the Solstice Day, it was quite impossible for men to get a fixed time to count from, until they arrived at it later by the "Pyramid Shadow Method," which seems to have been the obvious and only available means by which early men could find out and exactly record the Seasons. In doing this they were forced to closely observe the Equinox, which always had such prominence in Ancient Astronomical Records.

To aid the reader's grasp of these arguments the following currently suggestive diagram of Jacob's "Amplitude Observatory" is designed as looking due East, in accordance with early Bible records and Ancient Eastern custom.

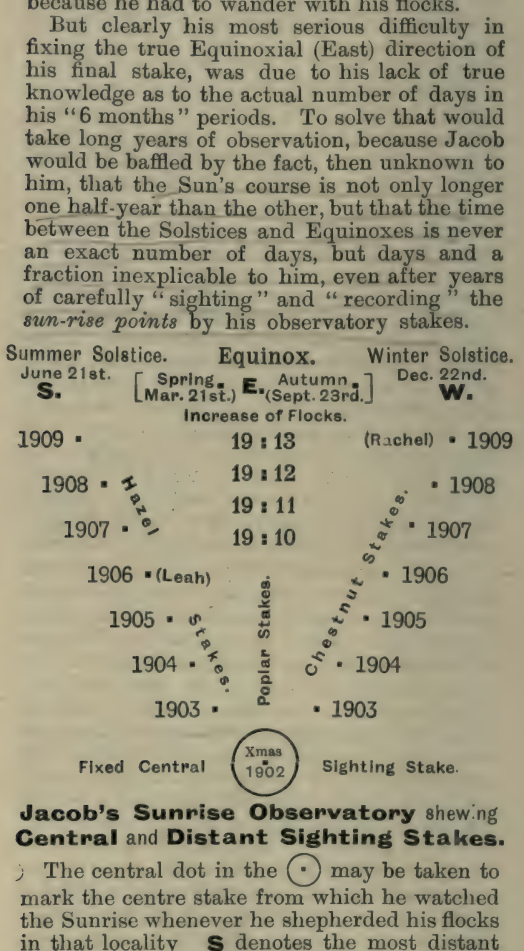
Though 1902 is shown as the first and 1913 as the last date of the stakes driven to accord with Jacob's twenty-one "*half*-years" of service (seven for Leah, then seven for Rachel and seven for flocks), I hardly think that he could have accurately found the half-year's length out within the fraction of a day, because he would be subject to very serious drawbacks which we know little of.

To begin with, his stakes would be difficult to cut, sharpen and notch without knives, etc. Then he had no iron gablock to pierce the stony ground, into which his stakes had to be driven. They could not, therefore, be very firmly fixed into the ground at first.

Naturally the sheep, when irritated by insects would rub against them and therefore sometimes throw them down, when Jacob would have great difficulty in erecting them in the same holes. (Readers who have seen the stony ground of Syria and the country East of Jordan will more fully appreciate the reality of that difficulty.)

If the stakes were not kept rigidly erect, any leaning to left or right would divert the sighting line (which beginning at the central stake, lines to the top of the distant stake and extends to the horizon) to a misleading point on the horizon. The fierce storms and winds of that region would often cause such deflections, whilst wild Arabs of the desert or Laban's servants jealous of Jacob, or jealous Laban himself might at times disturb the stakes, even if the urgent need for firewood in that almost treeless country did not cause others to use them, when it is obvious that Jacob could not always be there to guard them, because he had to wander with his flocks.

But clearly his most serious difficulty in fixing the true Equinoxial (East) direction of his final stake, was due to his lack of true knowledge as to the actual number of days in his "6 months" periods. To solve that would take long years of observation, because Jacob would be baffled by the fact, then unknown to him, that the Sun's course is not only longer one half-year than the other, but that the time between the Solstices and Equinoxes is never an exact number of days, but days and a fraction inexplicable to him, even after years of carefully "sighting" and "recording" the *sun-rise points* by his observatory stakes.



Jacob's Sunrise Observatory shewing **Central** and **Distant Sighting Stakes.**

The central dot in the ⊙ may be taken to mark the centre stake from which he watched the Sunrise whenever he shepherded his flocks in that locality **S** denotes the most distant terminal rod marking his best effort to fix upon the Summer Solstice, whilst **W** marks his best stake attempt to fix the Winter Solstice.

The angular distance between **S** and **W** would mark his measure of the "Half-yearly Amplitude" which would appear equal for both our half-years, which he called "Years."

It would be wrong to assume, as most College trained men do, that Jacob could stake out his **S** and **W** Solstice points the first year. He could hardly have done so if he possessed their Almanac and knowledge, —which he did not. He therefore would try his best to count the days between the extreme SOLSTICE AMPLITUDES.

At first he would certainly fix his **S** and **W** Stakes at too short a distance, which gradual experience would force him to extend as I have diagrammed. We will suppose that he started on the right or shortest day (which I cannot believe that he could first fix upon), *i.e.*, December 22nd, our old Yuletide of 1902. Six months later he would drive stake **S** 1903, followed at the end of that year by **W** 1903, and so on, as shown, extending the distance of each later stake to get greater accuracy by their adjustments, whilst counting the days between each season, until ultimately he would be forced to conclude that he could not fully solve the problem that way.

AMPLITUDE RECORDS at the EQUINOXES were ESSENTIAL.

His imperfect time observations would then direct his careful attention to the Equinoxial point **E**, midway between **S** and **W**, *when day and night appeared more equal.* By closer observation of the daily "Amplitude" change at that half-yearly time when he would all the more intently watch because that was his critical time for sheep and goat-breeding, he would note that the daily changes in the Sunrise points were then much wider apart and could therefore be differentiated with far greater certainty. That he would mark by driving his first **E** Stake about March 21st, 1910.

If Jacob's 1st **E** 1910 stake was driven a little to the *left* of the true **E**, then he would necessarily count 2 or 3 days less in his **S** than in his **W** "Years" (our Half-Years); whilst if the stake had been driven a little to the *right*, his **W** "Year" (Sept. to March) would have been recorded 2 or 3 days short.

That difficulty is very much greater than anyone can realize who has not experimented, because the error doubles in the first half-year and quadruples in the next, as the total days between the two sunrises registered by a stake 1 day's amplitude nearer to **S** would register 2 days *short* in Jacob's **S** "Year," consequently, as his **W** "Year" also counted from that stake it would appear 2 over, and he would be puzzled on finding that **S** was 4 days short of his record of the **W** Year.

Assuming that Jacob's quick perception led him to halve that difference and drive his 1911 stake 2 days to the *right* of the 1st one marked 1910, he would be puzzled again to find why the difference was reversed and **W** was then 4 days short of **S.** His next stake might cutely be driven a day to the *left*, still, though he was

getting nearer, the unequal transit times of the Sun between **S** and **W** would require years of observation to determine, and ever afterwards need close watching, as the then unknown ¼-day in the Year's length varied the **E** Sunrise.

I submit that it is thus proved that only the "Amplitude changes" of Sunset or Sunrise **at the Equinoxes** could be daily distinguished to primarily discern the time from which early men could count the days in the Year within reasonable accuracy, by recording and counting from and to the days when the Sun rose or set each year at the point nearest to the true East.

Of course, as Jacob did not know the Meridian he could only approximately locate true East, but by counting what he thought to be the days to the next (September) Equinox he would find that the Sunrise varied about a sunbreadth from his first **E** stake. He would therefore then drive his second **E** stake, and continue to count the intervening days to the next Equinox, when he would find that the Sunrise was not exactly marked by either of the two previous stakes, so he would drive a third **E** stake, and so he would continue his experiments and drive more stakes, each of which he would distinctively mark by cutting notches or peeled rings in the bark upon them, so that he could identify their respective datal order and count the days between, until experience satisfied him which was the truest **E** stake, and the average number of days which lapsed between the driving of the successive stakes.

Thus his record of days between the Equinoxes would naturally become his Almanac as noted on the notched stick he would carry as his tally in that natural way in which the Clog Almanac was invented.

More than that, it seems to me almost inevitable that Jacob, not knowing nor suspecting the full Year's length, would be so intent upon finding his sheep-breeding periods that he most naturally regarded his stake-driving times as marking his "years" ending with each Equinox, just as we know the early Romans by applying the like principle marked their years by publicly driving the Year-Nail into the walls of the Temple of Minerva, as recorded on Almanac page 2.

That was all the more likely because even his earlier **S** and **W** stakes were also driven six months (moons) apart, and as day and night were equal when the sun rose in line with the truest fixed **E** stake noted from his fixed point of observation each Equinox, it seems obvious that he would thus adopt the "6 months" as the unit for counting his age, etc., when that was clearly his easiest and surest method,—especially after his ancestors had counted their ages by periods of 150 days, and he was convinced by long observation that his

method gave not only a better and easier unit for counting lives, but was of the greatest possible importance towards increasing that wealth and influence which would gratify his ambition to become a great and wealthy man.

No doubt Laban's grudging and unwilling, instead of generous, recognition of Jacob's great thought and care, caused Jacob to feel inadequately rewarded, and the more the growing injustice was felt, the less interest he would have in furthering Laban's interests, and the more determined would become Jacob's resolve to do the best for his growing family.

I submit that all this is completely in accord with the Bible's graphic description of Jacob's character. He was simply forcing Laban to recognise and reward his extraordinary skill, foresight and labour with the flocks.

Brief as are the Bible records of Jacob, they are most significant, for Genesis xxx., v. 40, expressly states that "*Jacob did separate the lambs*"—That was an absolutely essential step towards securing his crop of lambs each 6 months, for so long as Laban left the lambs and the rams with the flock all the year round, without efforts to restrict and direct the period of breeding, so long would the common limits of increase prevail, as now in Argentina, Australia, etc., where that custom prevents the shepherds from noticing whether particular sheep in that uncontrolled state raise more than one crop of lambs per year, as they occasionally do, even when wild.

Having (1) discovered the possibility of breeding lambs each six months, (2) fixed upon his six months' year by driving "Amplitude Stakes" and (3) separated his lambs and rams from the ewes, and (4) re-turned his rams to the ewes at each of his stake-driving periods, Jacob only required the fifth essential of *good feeding* to secure his desired two crops of lambs per year.

Mr. Rider Haggard in his letter of June 13th, 1901, pithily remarks, "These sheep will produce two crops of lambs a year *if well kept*," which shows that Mr. Ferris, of Upper Salthrop, had, by observation, separating his lambs, etc., regained and applied Jacob's knowledge of the true six months' year to sheep-breeding, and I sincerely hope for the sake of our poor people, that he and others will be as successful as Jacob so eminently was.

The thoughtful efforts and care of Jacob for his flocks is strikingly evidenced by the repeated references made in Genesis to the "Wells" which he dug. "There he digged a well" appears at almost every place where he stayed and prospered.

For myself, after seeing Jacob's reliably authenticated Well (where Christ met the woman of Samaria) at Sychar, which is now 75 feet deep, and probably was 90 feet deep originally, by 7½ feet wide, and is still securely built up by the old rough stones, I cannot doubt that Jacob used every available means to increase the lamb production of his flocks, as indeed he had the greatest incentive to do.

He saw that God through Nature helped those who helped themselves, and therefore used commonsense methods and industry to increase his wealth and power. He would never have wasted his energies in helpless wailing at the walls of the Temple, as so many of the Jews now do, but he would have set to work to remove the oppression and improve the conditions of life under which his descendants now live at Jerusalem.

We, like other travellers, were surprised to note the wonderful fertility of the apparently barren soil, which was covered with green grass within two or three days of a rainfall. Indeed, corn could be seen growing two days after being sown in Palestine, where without manure, corn, etc., can still be plentifully produced by applying the minimum of human labour. The weathering of the broken limestones in the ground is constantly renewing the fertility of the soil, so that now the Arabs simply wait for a shower of rain, sow their seed upon the damp ground which they then scratch over, and leave it until harvest time.

In considering the feasibility of Jacob getting two crops of lambs and kids per year, it is important to remember that the climate and rainfall of Palestine was formerly far more productive of good grazing, etc., than now, when the gradual change of the terrestrial pole's position has so long been gradually reducing Syria to a more arid and desert-like climate—as will be shown in the larger edition. Meantime I may point out that study of the recent geological evidence in Palestine and the undeniable evidences of the ancient terraced vineyards, etc., which can be seen by hundreds, incontestably prove that rainfall and consequently vegetation, etc., was far more plentiful in ancient times, therefore Jacob could no doubt get abundant pasturage for his flocks when he had also such a wide, free range over a fertile country, had many servants, and took the care he did to dig wells, etc.

We cannot doubt that Jacob was a good shepherd and we may be sure that he found good pasturage for his sheep. That seems evident from Genesis XXX. v. 36, which says that there was a "3 days' journey betwixt himself (Laban) and Jacob," therefore it is clear that Jacob had every facility and incentive to secretly carry out those great experiments in the breeding of sheep, etc., which enabled him to found his family into a great nation influencing mankind for good.

The secretion of coloured males in the mountain caves, and their being let loose overnight amongst the flocks at the right season, would readily account for the straked and spreckled young coming from the apparently uncoloured flock.

Notwithstanding all the efforts of Jacob's admirers and commentators during nearly 4,000 years past, no one has yet been able to find in such rods any breeding value for colouring of young animals,—simply because there is no such colouring influence derivable from "straked rods."

That the foregoing is the true explanation, is clearly established by Genesis XXXI., v. 10:—

> "And it came to pass at the *time* that the cattle conceived, that I lifted up mine eyes, and saw in a dream and, behold the rams which leaped upon the cattle were ringstraked, speckled, and grisled."

Again in verse 11:—

> "And he said, Lift up thine eyes and see, all the rams which leap upon the cattle are ringstraked, speckled, and grisled."

I only mention this to prove that the "ringed and straked rods" had nothing whatever to do with the colouring of the young animals Jacob secured by strategy within his agreement, but were used as "sighting rods" to locate the Seasons of the Year, by staking out the "Amplitude" of the seasonal points of Sunrise, to make sure of the best times for mating the flocks.

Full consideration of the points stated show that the stakes constituted an important factor in the method which Jacob studiously worked out to increase his flocks, and prominence was rightly given to them in the record, because traditional value was attached to that direct "sighting-rod method" of finding the Seasons.

That is unquestionably the simplest means ever found out by men to trace out Nature's Seasons, and as the two due East rods Jacob used to locate the Equinoxes by sighting the sunrise points were, through their easy removal and re-erection, so eminently suited to the nomadic habits of Jacob's descendants, we need not be surprised to find that they tenaciously clung to that handy method of recording time until the Exodus from Egypt.

Although my researches convinced me that such was the case, I had not the remotest hope of being able to definitely prove that fact;—indeed, it was not until after my first pamphlet was actually printed, that, during an illness, I accidentally read Exodus XII., v. 40, which most clearly and emphatically states:—
"NOW THE SOJOURNING OF THE CHILDREN OF ISRAEL, WHO DWELT IN EGYPT, WAS **430** YEARS."

PROOF that the ISRAELITES used JACOB'S "HALF-YEAR" UNITS of TIME until the EXODUS.

My experimentally formed belief that those so-called "years" were really *half-years*, led me to test that period by the Bible chronology of the Authorised Version. Turning to Gen. XLVI. and XLVII., which records the events of Jacob and his family's going down to settle in Egypt,

I found that the date recorded over those chapters was ... 1706 B.C., and as the date over all the Exodus chapters was ... 1491 B.C., that proved that there was — only a stay in Egypt of ... 215 full yrs.

and as that was exactly half the recorded 430 Israelitish "years," it proves that they counted by "½-years," therefore there can be no doubting the fact that until the Exodus the Israelites continued to use Jacob's stake-found "6 months' year," by counting the Equinoxial Sunrises.

I was delighted to find such final and absolute proof, which raised my idea that the Early Bible Men only lived the present known length of life, and must have counted by smaller Time Units than our Year, from the status of a theory to that of a firmly established fact.

I am quite aware that commentators have endeavoured to account for this "430 years' period," by stretching it back to the time of Abraham's first visit to Egypt, (as the writer of the Septuagint did in his efforts to adjust the apparent discrepancy and also with similar unjustifiable license purposely added 100 years to each of the lives of several Patriarchs, to make the Samaritan records appear more venerable than those of the Jews)—*but that is a subterfuge quickly disposed of, because Abraham and Isaac being "forefathers" of Jacob (Israel) could not be included as "children" of Israel, therefore the latter term, as used in the original sacred scriptures, could only apply to the "descendants" of Israel, who alone therefore clearly counted their* **430** *"half-years" whilst in Egypt.*

The writer of the Septuagint knew that the **215** true years, which were verified by Egyptian chronology, could not be refuted, hence his expanding efforts to reconcile the **430** "years" recorded, when he did not know they were only *half-yearly counts.*

I confidently submit to all fairminded and unbiassed readers that the original authenticated record proves beyond the possibility of quibble, that the Israelites had most naturally clung to the simple "6 months' year" which Jacob (afterwards called Israel) as the Father of their Race, had discovered during his prolonged 21 years' experiments when serving Laban.

The proof seems as definite and independent as can possibly be desired, especially when read in connection with the clearly established details of the previous 150 days' Patriarchal period from the Deluge record on pink page 8, which is so wonderfully corroborated by the known **57** days' difference between the "Israelitish Era" and the "Era of Nabonassar," *the founder of Babylon*. The latter proves absolutely that Noah started a New Era on the 27th day of the 2nd month, when he left the ark, *i.e.*, **30** days of 1st month + **27** of 2nd month = **57** days were dropped from Israelitish chronology, when Noah started the "New Era" by counting from that recorded day of landing, as a fresh New Year's Day.

Lest anyone should imagine that the **57** days' difference was invented to fit my case, I may say that this **57** days' difference also exists between the "Julian Era" (which claims to go back long before the Deluge to 4714 B.C.) and the "Era of Nabonassar," which, according to Sir Harris Nicolas' "Chronology," page 17, which I here quote, "commenced on Wednesday, the *26th February*, in the 3967th year of the Julian period, *i.e.*, 747 B.C."

Thus the **31** days of January + the 26 of February make the **57** days which the "Julian Era" lost by counting in Noah's reckoning, without knowledge of the lapse of the last **57** days recorded as having been spent in the ark, till the 27tth day of 2nd month of the preceding year only thus partially used, which day became the *1st New Year's Day* of "Noah's Era."

Evidently Noah and his descendants (if they gave thought to the matter) considered the **57** days, which they thus skipped back, as too short and complicated a fraction of their year to let it count further in their records—at any rate, they ignored it when starting their New Era.

Yet our Oriental Scholars and Astronomers have found it necessary to adjust for these **57** days in comparing the dates of "Eclipses of the Sun" and other astronomical data found in the Babylonian records, with those of other Ancient Nations; whilst our eminent chronologers recognise the absolute necessity of allowing for these **57** days whenever comparisons of dates are required within the "Julian" and "Babylonian Eras."

From the foregoing it will be seen that the **57** days' differential record, is as perfectly impartial as that of the **215** years' difference between Israel's going down to Egypt and the Exodus; for obviously, I had nothing whatever to do with fixing either the **57** days' difference in the eras recorded by Sir Harris Nicolas in the year 1838 A.D., nor those ancient reference dates which are evidenced in the Authorised Version of the Bible.

We thus see that there was a reasonable cause for the origin of the 1, 5, and 6 months' eras, which extended until the time of the Exodus, when Moses instituted the 12 months' Equinoxial Year *(of which he had learned the great value from the Egyptians)*, by the command in Exodus xii. v. 2, which reads—"This "month shall be unto you the *beginning of* "*months;* it shall be the *first month of the* "*Year* unto you."

From that *first day of the Exodus* until now the Bible years may be compared with the Eras of the Egyptians, Babylonians, etc., but before the Exodus the chronology of Genesis and Exodus has, in my opinion, hitherto been distinctly wrong, and widely, though not purposely, misleading. Possibly this explanation of the growth in the length of the Year units used by the Patriarchs may soon enable us to further corroborate the Genesis record by facts from Egyptian and Assyrian testimony.

These facts form a sufficiently reliable basis upon which we may reasonably conclude that the lives of the Early Bible men were of similar length to our own. That deduction is further proved when those lives are proportionally adjusted to our full years (as shown by the calculations given in the pink Bible Ages section), in accordance with the Patriarchal shorter units of count, for then those lives come within the credibly known ages of men.

This rationally solves the hitherto perplexing problem of the lengths of those early lives, and removes that stumbling block for Biblical students, who rightly considered the recorded ages to be incredible when estimated as in our full year lengths of time.

In Olden Times the birth of a new idea was generally described as revealed *in a vision or dream;* indeed, the idea of thought was hardly ever directly expressed in early Bible Times, because fresh knowledge was accepted as revealed by the Spirit of God.

Similarly, the old alchemists in the Middle Ages, not understanding chemical action, superstitiously wrote that the spirit of Mercury was seen wrestling with the spirits of the other elements they were seeking to compound into the longed-for gold alloy.

The question as to how new thoughts and ideas arise in our minds has probably aroused the interest of thoughtful people in all ages, yet no definitely satisfactory answer has yet been found.—That query has often occurred to me, but the way in which new thoughts intrude when least expected whilst the mind seems perfectly at rest, or at other times when engrossed in entirely different subjects, or even in sleep, seems almost to preclude the possibility of our discerning how fresh thoughts are imparted to men.

We still know very little as to how entirely new ideas are born to us, though experience suggests that they are best developed in most earnest thinkers, on the principle of "Seek and ye shall find."

BIRTH of NEW IDEAS in DREAMS, etc.—ANCIENTLY regarded as VISIONS.

Within the small limits of this book are expressed some ideas which, so far as I am aware, have not during recent centuries been disclosed to any other human mind, and, so far as they embody points of truth, I believe they were born and developed according to the intensity of thought and earnest mental effort applied, though under circumstances which almost encourage the idea that new thoughts are given to us from a force outside ourselves.

Generally speaking, I have found that the most fertile ideas have come to me whilst walking, *but the thought that early men could never have known the length of the Solar Year, and must have counted their lives by days and months, followed by gradually extending periods of count until the true year was found many centuries later, certainly impressed my mind whilst in sleep, and awoke me*, so that I alarmed my wife by getting up and jotting down the leading impressions before resuming my sleep,—lest they should disappear from my mind before morning.

I was so struck with the reasonable probability of that solution, that I felt those sleep-developed ideas ought not to vanish with a dream, but should be tested, and, if proved, then recorded in the cause of knowledge and truth.

No doubt the fact of my thoughts being engrossed during the previous evening, with the enormous difficulties encountered by early men when searching out the length of the Year as their basis of Time, had weighed upon my mind and possibly led to the dream; but still it seems almost unnatural to say that when I could not see the reason whilst wide-awake, it was made plain to me whilst asleep.

Were it not that I had in my sleep some years before, solved a perplexing mathematical problem which had baffled me when wearied and working too late the night before, I might have superstitiously regarded that dream as of special significance; hence, I can quite appreciate how naturally the earliest races of men might reasonably believe that new ideas were disclosed to them in visions or dreams, as they could not otherwise account for the dawn of new ideas upon their minds, and lacked the immense advantages we have inherited in the collective wisdom and extensive means of mental inter-communication, which mankind has developed and accumulated during the thousands of years the world has been peopled.

I consider that it is extremely probable that when first the idea of building a pyramid dawned upon the first pyramid designer, as the best means of tracing out the course of the Seasons, *it would be regarded as a divine inspiration*, and so add to the enthusiasm with which that utilitarian idea was taken up, carried into effect, and afterwards led to pyramid worship in ancient countries.

PHARAOH'S DREAM explained by JOSEPH.

The foregoing remarks upon dreams are introduced as preliminary to the rational explanation of Joseph's renowned interpretation of Pharaoh's dream, which I hope to demonstrate as a proof that up to that time the Egyptians collectively *(outside the privileged pyramid priests)* did not then know, nor did they individually record, the true Year's length.

Probably Jacob had heard from Abraham's first journey to Egypt (Genesis xii.), the vast importance of *season knowledge* to guard against famine, and ensure the power-raising force of the great nation of Abrahamites for which their family longed.

The wonderful account of Egypt which Abraham no doubt told to his only direct and dearly-loved grandson Jacob, would impress the latter at an early age, and would act as a great incentive to Jacob in that watching the seasonal motions of the Sun, which led to his finding the *Equinox* by gauging the *Amplitude* of the Sunrise points, as already explained.

The result of those early experiences Jacob would undoubtedly delight to instil into the developing mind of his promising son, Joseph, who would thus start life with a high sense of the dominant importance of the great Year problem.

Later, Joseph's original and observant mind did, doubtless, mature some definite ideas of the Seasonal motions of the Sun, hence, upon arrival in Egypt, his evidently free tongue led to his being straightway placed in the charge of Potipher, the executive priest of the Sun-worshippers at "On," lest his practical thoughts should be divulged to the common people.

The Pharaoh in Joseph's time became much more powerful than his immediate predecessors, whose kingdoms had been weakened by dissensions, wars, and famines, when frequently several Pharaohs reigned at the same time in different parts of Egypt.

It is very important to remember, that the Pharaoh ruling Egypt when Joseph arrived, was not an original Egyptian, but one of the successors of the "Shepherd Kings" who with a barbaric horde had overwhelmed the ancient civilization of Egypt, and whom the surviving Egyptians contemptuously called "Kyksos," and looked down upon as shepherds.

We know from Egyptian History that there was an admirable old-established civilization in Egypt long before Abraham's first visit, but that the best factors in that civilization (which comprised the earliest pyramid builders) was swept away by this relentless barbaric invasion of the Asiatic horde.

It is extremely probable that during that invasion the then pyramid priests, who alone knew the pyramid method of Year-finding research, were overwhelmed and exterminated, for escape from such a country would be almost impossible, as flight into the desert would mean almost certain death, even if the sudden swoop of the invaders left them any chance of escape.

On the other hand, if any did escape with the secret pyramid knowledge, we may safely conclude from what we traditionally know of their secretive pride and exclusiveness, that they would die rather than reveal their secret.

How strong that national, selfish, secretive influence was in the pyramid-building Egyptians, *who had sacrificed so much to attain that cherished knowledge*, we can never realize, though we get some slight insight into that from the Greek writers, who experienced the extreme exclusiveness evinced by the Egyptians, when the early Greek traders, etc., first forced their way into Egypt.

Perhaps we may better grasp the effective force of that exclusive Ancient Egyptian policy, when we recognise that the same extreme conservative spirit has for over 4,000 years governed the foreign dealings of that other great ancient nation, the Chinese, until now.—**It must have had a most intense hold upon ancient minds, to maintain its force throughout all those Ages to the present time.**

From the time of Joseph we have almost continuous History, which does not mention pyramid building; therefore we may reasonably conclude that the erection of huge pyramids had become extinct, and that its devotees perished during the ruthless invasion of the savage Asiatic hordes who devastated Egypt under the first "Shepherd Kings."

[That extermination of the original pyramid priests seems far more probable, when we remember that History proves how the much more powerful civilization of Greece and Rome were about 2,000 years later practically crushed out of existence by the hordes of the barbaric Goths, etc., which then swept over Europe.

Old records were then swept away by their furious onslaught, because extermination was then their rule, being far easier than keeping prisoners.]

Dread of repeated invasions, no doubt, tended to encourage the exclusive policy of the Ancient Egyptians.

Possibly some well-informed pyramid priests may, during the "Hyksos" invasion, have escaped up the Nile to Ethopia, and their descendants may have returned with some Pyramid Year-recording knowledge, after the "Shepherd Kings" were expelled in later years. At any rate, we know that pyramid building was preserved in Ethiopia.

It is because there are strong reasons for believing that the pyramid builders then perished, with their secret of its shadow method undisclosed, that I have inserted the Biblical evidence in this Pyramid Section.

JOSEPH'S Interpretation of PHARAOH'S DREAM.

The recurring Famines *(due to the intruding "Shepherd Kings" not knowing the true length of the Year, and the people being suddenly deprived of the ancient pyramid priests' guidance)* had become the scourge of Egypt and chief source of anxiety to its rulers—for Famine was a frequent cause of wars intended to seize the food supplies of neighbouring States, —hence Pharaoh's anxiety on that point, through the cares of a State which relied upon numerous slaves for labour and warlike purposes, naturally led to the disturbed mind which evolved the "dream" recorded in Genesis xli.

Joseph's active mind had from childhood been peculiarly susceptible to dreams, *vide* Genesis xxxvii. As a sharp, intelligent lad, he had been the joy and pride of his father Jacob, *who gave him privileged attention*,—a fact which gave rise to the envy of his brethren, —as recorded in *verse 3*:—"Now Israel loved "Joseph more than all his children, because "he was the son of his old age; and he made "him a coat of many colours."

Joseph first showed evidence of strong individuality and ambition as a boy, by his "dream" about the Sun, Moon, and the eleven Stars, bowing down to his (the 12th) Star, proving that his mind had previously been troubled about the movements of the heavenly bodies, which had specially attracted his attention, as evidenced by Genesis xxxvii. v. 9 and 10.

[Our little son, when five years old, first saw the stars through the bare trees overhanging the road when coming down Holgate Hill. Thus seen, as we walked along, whilst the branches remained fixed above us, the stars appeared to be falling. He clutched my hand in fear, and it was not possible to convince him that they were not falling, until we stood still; but directly we resumed walking he held that the stars continued to fall, but would be a long time in getting to the bottom, so we might get home first if we were quick.

That disturbance of mind led to his night's rest being disturbed by dreams, and, as a consequence, he told us some fabulous tales next morning as to how the falling stars, especially the big one (the moon), "had frightened all the children he knew, by falling like fires."]

Probably Joseph's dream arose from similar mental disturbance.—It may even be that some excited discussion may have occurred in the family circle respecting the 12 Signs of the Zodiac, which seems to have been developed about that time, and about which Jacob might have learned something from Abraham and Isaac, or the Chaldeans, and so passed on to his ideal child, Joseph—who, being born to Jacob in mature years, when he had most time to train that child who inherited the best character traits of his thoughtful ancestors, had absorbed the proud father's strongest interest.

Reference to the Moon could not have implied (as Jacob inferred) that Joseph's mother would in the future bow before him in this world, because she had previously died when Benjamin was born.—We thus see that a deeper significance underlies the subsequently mutilated tradition, and called upon "his father to *observe the saying*." Genesis xxxvii. 11.

In any case, that remarkable dream of the Sun, Moon, and Stars would have a marked effect on Joseph's mind, and lead him to study them intently in after-life.

Joseph thus probably knew from his father's related and his own experience, that dreams generally resulted from physical or mental disorders, especially when stimulated by anxiety; and he had inherited sufficient of that keen insight and craft which characterised his father Jacob's dealings with Laban, to enable him to grasp the situation and seize his opportunity.

The prison incident, together with Joseph's well-known powers of discernment, opportunely brought him before the notice of Pharaoh, whose dream had to be explained.

Joseph promptly diagnosed the case, and no doubt fully ascertained the nature and extent of Pharaoh's difficulty at the interview, when he also propounded the boldest and most statesmanlike policy ever known, and which he afterwards carried out, as we find recorded in History.

That policy successfully surmounted the three greatest and most difficult problems which ever perplexed the rulers of early civilized nations:—

(*a*) Famine provided against and banished;

(*b*) The adjustment of the Civil Year to the Solar Seasons;

(*c*) The Nationalization of the Land.

These appear to have been accomplished under the cover of Pharaoh's "*dream*," as Pharaoh could never have dared to *openly* appropriate or confiscate the lands of his agricultural people, when most of the owners of the soil (excepting the priesthood) were his soldiers, upon whom he depended for the maintenance of regal power, and the subjugation of such of the sullen Egyptians as had been spared.

The probable facts which I read as underlying the story of Pharaoh's dream are these:—

(1) Joseph's practical observations and insight enabled him to see that the Famines were mainly due to the *Shepherd Kings'* Civil Year drifting out of gear with the Seasons.—It is an established fact that about that time, through several centuries all the Seasons were gradually drifted through every part of the passing years.

(2) He saw that by adjusting the Civil Year to the Solar Seasons, Famines could be largely prevented, but to do that the co-operation of the priesthood was essential.

(3) His connection with the priests proved that they had the secret and power of publicly declaring the Calendar or progress of the Year, which the simple-minded people implicitly acted upon.

(4) The Pharaoh was popularly acclaimed to be directly descended from the Sun (God), from whom his wisdom and power were directly received, as shown upon page 13; therefore the common people naturally believed that he possessed supernatural knowledge of the Seasons, and the more readily accepted his forecasts for the passing Years.

(5) Through those remarkable perceptive powers Joseph possessed, as recorded in History, his interviews had enabled him to discern the fear of Famine and consequent pestilence as the true cause of Pharaoh's perplexity and dream.

(6) The *prevailing Landed System* of military tenure held by the invading captains who oppressed the proud, resentful Egyptians, was (by alienating the interest of the real tillers of the soil) undermining the prosperity of the great nation Pharaoh was ambitious to rule in peace and splendour.

On careful mental weighing of those factors in the case, he saw that drastic reforms were required to put the government upon the right basis, but as the Egyptians clung tenaciously to old traditions, the only way to right the Year, and destroy the iniquities resulting from the private ownership of land, (which were being aggravated as the population increased,) lay through a combination of the superstitious power of Pharaoh and the priests over the people.

To accomplish those great reforms, he appears to have hit upon the following marvellously well-arranged and deeply designed plan:—

The already unseasonable and not finally settled position of the Civil Year was to be kept adjusted, as Joseph knew how, to Jacob's Equinoxial Year during seven years, to ensure abundant crops, during which time Joseph, as the author of the scheme and agent of Pharaoh, was to buy up *one-fifth* of all the corn, and store it securely in royal granaries, whilst at the same time the government obtained the confidence and goodwill of the people.

Then, when the profuse crops had tended to make the ignorant population more careless or less observant *(especially when the Year was sometimes of* 12 *and at other times of* 13 *Moons)*, the Calendar would, through Pharaoh and the priests, be diverted a few weeks less or more per Year, to put the Civil Seasons out of gear with the Solar times, and thus cause seven years of growing Famine, during which time the people would have to buy from the royal granaries at the high prices which Joseph could exact through the "*corner*" *or monopoly* he could thus undoubtedly secure for Pharaoh's advantage.

[That could be done without arousing any suspicion, because the common people were so illiterate, that, through entire dependence upon the traditional and habitual acceptance of the priestly declarations as to the Seasonal operations of the Year, they did not need to count, but accepted that condition of their almost mechanically arranged mode of life with child-like simplicity.]

Gradually, the people would have to sell all their moveable goods, and eventually their lands, to Pharaoh, to avert starvation (as we find most distinctly detailed in scripture), *until at last all the land would be bought up for Pharaoh*, and the people led to look upon Pharaoh and Joseph as their deliverers from the terrible impending death of starvation, by the wise accumulation of food during the "good years."

[*When we remember that nearly 2,000 years later, similar trickery was practised upon the enlightened Romans, necessitating Julius Cæsar's Reform of the Almanac in the Year 46 B.C., when the Civil Year was over 3 months out of gear with the Seasons, through the selfish desires of the Roman Pontiffs in extending the Civil Year to prolong their individual Year term of office, we can realize the feasibility of Joseph's plan applied to the illiterate Egyptians so long before.*]

His astute plan, so admirably conceived, was successfully carried out with the assistance of the priesthood, who alone were allowed to retain the possession of their land as a reward for their loyal secrecy and help.—That confirmatory fact is clearly established by Genesis xlvii., v. 22, which reads:—"Only the land of "the priests bought he not; for the priests "had a portion assigned to them of Pharaoh, "and did eat their portion which Pharaoh gave "them: wherefore they sold not their lands."

There is no wonder that "the thing was good in the eyes of Pharaoh" (xli., v. 37), for by this scheme every Egyptian was individually brought to recognise Pharaoh as the all-powerful and wise monarch to whom they owed everything, and were also bound by the closer personal ties existing between landlord and tenant.

When this great scheme of "Land Nationalization" was completed, "Joseph made it a law over the land of Egypt unto this day that Pharaoh should have the *fifth* part" of the produce as rent, "*except the land of the priests only, which became not Pharaoh's*" (xlvii., v. 26), which shows that Joseph was fair-minded, and not deliberately exacting.

No doubt, the last years of the Famine proved more exacting than had been anticipated, because, as the *earlier* Egyptians were the most advanced in Solar knowledge through their pyramid experiments, the surrounding nations had formerly followed their lead as to the times for doing their seasonal agricultural work; hence, whilst they reaped the benefits in good years, no provisions were made to withstand the bad Seasons by which Joseph had schemed to secure the land; therefore more of the neighbouring nationalities had to draw supplies from Egypt than had been anticipated, consequently, the treasures of the neighbouring nations were thus brought into the coffers of Pharaoh: hence the end of the Famine would be a most trying period, seeing that it was imperative that Joseph should conserve sufficient seed to sow at the right time to ensure a fair harvest for the people.

After then, we may rest assured that Joseph took precautions to keep the Civil Year true to the Seasons, because the prosperity of Egypt after then is most marked.

The masses of the people, and the world at large to-day, are all the poorer for the subsequent divergence from that wise and sound basis of land tenure from the nation, as established by Joseph nearly 4,000 years ago, by which in good years everybody benefited, and proportionately paid for good government, whilst in less prosperous years the burden was equally borne, instead of, as now, being saddled upon the hard-working peasantry and farmers, who are the mainstay of our healthy, vigorous race, yet whom the hard-hearted (I admit honourable exceptions) landowners may almost ruin at will, whilst as absentees they lounge in luxurious ease—utterly unmindful of that high calling to the humane duty of "doing to others as ye would that they should do unto you."

The all-pervading root-problem of Land Values generally, and particularly the unearned increment developed by the industry of the toilers in our great cities, which in our time perplexes the statesmen of every civilized country throughout the world, and will become more aggravated as time goes on, can only be satisfactorily and completely solved by Joseph's remedy,—the Nationalization of the Land.

That, more than anything else, would enable us to uproot the crying evils of overcrowding in our great cities, and oust those insanitary conditions which constitute death-traps in the

areas of the submerged poor, who are "kept under" very largely by private landowners exacting an undue proportion of the tenants' earnings for a miserable system of housing, whilst those very landlords are unblushingly pocketing the "unearned increment" which is entirely due to the presence of the hive of humanity which our landed system has placed under the heel of unscrupulous landlords.—It is high time something was *done* beyond *talk* towards the "Taxation of Land Values," which might well be taken as a beginning.

Joseph's equitable system of national land tenure would also uproot many other injustices now inflicted upon the toiling masses of our people. *e.g.*, Under that righteous system, it would have been impossible for the rich coal-owners to exact, as they have done this year, *an extra profit of over* £60,000,000 from our workers, who are already burdened with the excessive cost of the South African War.

The root-fact which the newspaper writers have not realized is, that the limited number of rich coal proprietors seized their opportunity (caused by the War, etc.) to become richer, at the expense of the poor, who are thus left all the poorer,—not only through the increased price of coal, but also through its more far-reaching indirect effects in increasing rents, interests, and prices of food-stuffs, etc.

The worship of selfishness and insensate grasping after wealth in this materialistic age, beyond warping the natures of the selfish money-grubbers of our day, is crushing out many of the truest joys of life, and unjustly keeping the bulk of humanity down almost to the level of automatic machines.

I think that the foregoing shows a reasonable probability that the 12 months' Year was locally re-applied by the "Hyksos" rulers of Egypt about the time of Joseph (possibly at his instigation), *because definite historical records of Time then begin.* He was quite old enough to understand his father Jacob's careful, simple teaching respecting the Seasonal variations of Sunrise before being sold into Egypt. That is borne out by the fact of Joseph being straightway placed under the care of the Egyptian Sun-observers at "On."

The name of Joseph's master was *Potiphar*, and the priest whose daughter Joseph married was named *Potipherah*, both of which signify "*He who worships the Sun.*" Further, the Sun was the god of "On," the chief centre of the "Disc-worshippers," and the most ancient capital of Egypt, whilst Potipherah was declared to be "*the* priest of On," *now called Heliopolis*, which was located near the Great Pyramid.

After the Year's length was determined by the pyramid experiments of the "Disc-worshippers," or, as we should more properly call them, "Sun-observers," their mission would be fulfilled and their power wane as the common people later became acquainted by experience with the term of the Year.

Hence, the priests would naturally keep knowledge of the great secret of the Year within themselves as long as possible, whilst on the other hand, that exclusive policy would arouse the curiosity of thinkers and searchers outside the priesthood.—As these latter were discovered, they were (like Joseph) induced to join the priesthood "on account of their learning," *but really to perpetuate the secrecy of knowledge as to the Year*, which was so jealously guarded that the common people were not allowed to learn even reading or writing, lest they should find out the secret Year.

That knowledge gave enormous power to the priests, because by moving the civil Year they could outwit the people, and so bring profit to the priesthood and the people into implicit subjection, as Joseph so strikingly did.

Judged impartially, the books of Moses may almost be described as writing up the Israelites and decrying the Egyptians, for he makes no acknowledgment of the great benefits he undoubtedly derived through being "educated in all the wisdom of the Egyptians," nor does he even mention their astronomical knowledge, mighty buildings, etc.

It is established by Egyptian records that Moses, who was taught astronomy, mathematics, etc., by the priests of On, was thereby mentally strengthened for the sifting of truth from amidst the exaggerated fiction of Egyptian traditional records.—Therein lay much of his power over the people.

Will those Biblical Scholars who wish to believe that Moses did not derive his statesman-like knowledge from the Egyptians, reasonably explain how otherwise he came to lead the Israelites out of Egypt, *and compel them to begin a new* 12 months' *Year and Era* as from the Spring Equinox, when that Equinoxial basis of Year knowledge embodied THE VERY ACME OF EGYPTIAN WISDOM, AS DERIVED FROM EARLY PYRAMID RESEARCH?

It is almost impossible to doubt the evident fact that Moses derived the sound basis of his broad and liberal-minded education from the Egyptian priests, as emphatically recorded in the Bible words "and Moses was learned in all the wisdom of the Egyptians."

This is strikingly corroborated by the Egyptian tradition that he grew up as a priest, under his Egyptian name of Osarsiph, receiving the tuition of the "Priests of On," who taught him Egyptian, Greek, Chaldee, and Assyrian literature (Comp. Strabo XVII., 1). He led the Egyptian Expedition against the Ethiopians (Jos. *Ant.* ii., 10-2).——From the Egyptians Moses especially learned mathematics to train his mind for the unprejudiced reception of truth (Philo, V.M. i., 5).

Thus, in the days when learning developed power he became equipped as a leader of men —able to sift evidence, to distinguish great principles and truths, as well as to enforce his commands.

Having been educated at On (Heliopolis), that city of the Sun and Egyptian University, (where research was centred in the pyramid rays which were focussed to find out the true Year by fixing upon the Vernal Equinox as the pyramid shadow-traced *pivot of the Year*), we need not wonder at Moses holding that most valued foundation fact of knowledge to be of such high importance that he most significantly timed the Exodus for that date, from which he emphatically proclaimed the *new era* to the illiterate Israelites in the words: "This month shall be unto you the beginning of months; it shall be the first month of the Year to you."

When "Year" probably meant a period or unit of time, we need not be surprised that the writer of Genesis used the term "Year" indiscriminately, because the Egyptians had always done so, and none dared to undertake the thankless task of adjusting history to later "Years" in face of the fanatical ignorance of the untaught people.

"Chronology" as the science of adjusting the Times and Dates of ancient history was not fully born to systematic study until a little over 350 years ago. Ancient writers copied the tabulated dates, etc., from prior perishing records, upon which they unquestioningly relied. To doubt those recorded fabulous ages almost amounted to heresy, hence the writers did not often (like the writer of the Septuagent did) waste thankless efforts in striving to reconcile conflicting differences in older records, nor did they decide principles upon which the counting of past "years" should be placed.

As our settled term of the year was unknown to the earliest men, they could not have recorded time in such years, and as the growth of the year term would be so slowly developed in many different stages, we cannot hope to recover more than a general indication of those varying and conflicting "eras" in use prior to written history.

Moses probably knew that the old *eras* varied, but was equally aware of the fact that the time was not opportune, neither was it then practicable to re-adjust past records when regarded by the people as sacred. Any attempt in that direction would then have aroused the fury of the people and defeated its own purpose.

For politic ends Moses had to fall in with the old moon reckoning of the pastoral and exclusive Israelites, especially as in the Wilderness there was not any fixed "Time-indicator" like the Pyramid; he therefore appears to have amended the lunar reckonings of the Israelites by adjusting them to work in with the Solar Years.

MOSES applied the TERM "YEAR" to the varying ANCESTRAL PERIODS formerly used as UNITS of TIME.

At the time of that change Moses was fully aware of the difference between the previous "years" and those which followed, yet he simply recorded the alteration in Exodus XII., v. 2, "This month shall be unto you the beginning of months; it shall be the first month of the year to you."—There was neither attempt nor need to dilate upon the "Usus Loquendi," which our college-trained friends urge as the strict basis of meaning Moses would apply in writing his record of "years;" for the further back we trace in human history, the more loosely does the term "year" prove to have been applied, as herein shown from Egyptian and Biblical records.

["USUS LOQUENDI" betrays just the kind of scholarly restriction which seems until now to have prevented this rational solution of the fabulous Early Men's Ages mentioned in the Bible.

The term "*Usus Loquendi*" assumes that the writer of any book would consistently apply such words as "year" to mean the true period of 365¼ days, but we know by other proofs that the first five Books of the Old Testament ("Pentateuch") commonly ascribed to Moses, were in some parts originally written at earlier dates by several authors, though partially re-copied and re-edited by Moses, as was customary in Ancient Times.

It took the earliest writers all their time to distinctly write what tradition had handed down to them, and though the lunar short and vague "Years" were partially understood by them, an elaborate and difficult explanation of the development of the "Year" was too abstruse for their primitive style of records, and was wisely avoided to save confusion and evade the almost hopeless task of adjusting the venerated ages of the patriarchs, which the interlapping eras rendered nearly impossible, especially when tradition held those ages to be sacred.

Besides, such a retrospective change would likely have been resented by the descendants of the patriarchs, especially as opinions would then be divided as to what was the length of the true Year, which was not found out until many centuries later.

Though, doubtless, Moses based his summary of the Creation and Patriarchal Times upon both Egyptian and Jewish traditions, his fuller knowledge was chiefly derived from Egyptian history, which accepted such fabulous ages in the earliest Dynasties and had such a strong hold upon the superstitious folk, that no statesman desiring power over the people dare publicly controvert them, when the people were pleased to cherish those fabulous ages as exalting the dignity and honour of their people above the surrounding nations.

A milder form of this historic pride still pervades international jealousies, but was most deeply rooted in the oldest civilizations of Egypt, Assyria, China, etc., who vied with each other in their exclusiveness and attempts to prove their particular nation to be the most ancient.

Probably no better instance of the construction of those fabulous ages can be found than the following "Analysis of the Old Egyptian Chronicle," which is quoted from page 20 of "Christianity, Judaism, and Heathenism," by Wm. Hewson, M.A., with details of the Dynasties inserted:—

No more conclusive evidence could be desired than is afforded by this Egyptian "Chronicle," in proof of my theory, that men's ideal units of Time or "Years" in which their lives were counted, would be inevitably developed from lesser units as men rose in the scale of civilization.

No doubt the earliest men's precarious means of providing food, etc., would engross attention regardless of the passing Time until they began to provide food beforehand. Then, as the value of time gradually dawned upon them, through the necessity of counting the number of days their little stores of food would last, and the pressing need of greater provision as their families increased, would enforce longer counts in days, until ultimately the lives of the children of Chieftains, or persons of prominent interest, would be first counted in days,—later in months by the moon,—and finally in "Years" by the Sun.

The following analysis of the Earliest Egyptian Chronicle, as recorded on the Great Egyptian Temple at Karnak, establishes unmistakeable proof of all these three stages.

1. The First Dynasty is recorded as having reigned 30,000 mythic "Years," which were in reality **Days.**
2. The next 12 Dynasties are typically inserted as lunations (*months*), and represent a separate Dynasty for each of the 12 months during which the evolution of their ideas of the Solar Year were being developed.—During all this long counting period the compilers appropriately counted by **Months.**
3. From the date that the Egyptians derived their first approximation to the Solar Year, their time is counted in **"Years"** and the records are continued in so-called "Years," irrespective of the evolution of the earlier stages, until the later stages were developed by:—

10 months = 300 days' "Years."
12 moons = 354 days' "Years."
12 months (of 30 days) = 360 days' "Years."
12 months + 5 days = 365 days' "Years."
12 months + 5¼ days = 365·25 days' "Years."

Still, all those varying lengths of "Years" are in the total counted altogether as **"Years."**

ANALYSIS of the OLD EGYPTIAN CHRONICLE.

No. of Dynasties.	CLASSIFICATION, Etc.	Number of Kings or "Generations" in each Dynasty.	Length of Reign. Mythic, Vague, etc. "Years."	Length of Reign. Solar Years.
1	VULCAN (Hephaistos), like the old Hindus "Brahma," was "regarded as the FATHER OF TIME," and therefore comprehending all Time.	1	for ever	—
	HELIUS (the Sun), son of Vulcan, and therefore of the same Dynasty, reigned 30,000 days or 1,000 months	1	(Days) 30,000	83
12	The 12 GODS, as deified impersonations of the stellar year.—These were evidently numbered as lunations in the Canon of Eratosthenes.	12	(Months) 3,984	322
1	The 8 "GODS OF EGYPT," called Demi-gods in this Chronicle.	8	(Mythic Years) 217	217
1	The 15 HERO-DEMI-GODS of the cynic circle.	15	443	443
	HORUS, as the superior of this class, "through whom the Gods last had communication with men."	1		
15	*These 15 DYNASTIES are evidently myths invented by the imaginations of Egyptian writers to magnify the ancient origin of their Empire, and though most if not all these "years" are Mythical, yet they are still fully counted in the above 34,644 "years'" total of the first recorded 15 Dynasties and the final 36,525 total of the 30 Dynasties.—M.B.C.*		34,644 "years"	1065
	DEFINITE DYNASTIES BEGIN.		(Solar Years).	Rough Date began to Reign B.C.
XVI.	Tanites	5	190	2231
XVII.	Memphites	4	103	2041
XVIII.	,, ...	14	348	1938
XIX.	Diospolitans ... ... *(Age of the Exodus)*	5	194	1590
XX.	,, (defective)	8	406	1396
XXI.	Tanites	6	121	990
XXII.	,, ...	3	48	869
XXIII.	Diospolitans	2	19	821
XXIV.	Saites	3	44	802
XXV.	Ethiopians	3	44	758
XXVI.	Memphites	7	177	714
XXVII.	Persians	5	124	537
XXVIII.	Saite	1	6	413
XXIX.	Tanites	5	39	407
XXX.	,, ...	1	18	368

30 Dynasties, 113 Generations, or **36,525** "Years"

This 36525 Total is most significant of the length of the Year being regarded by the Egyptians as the very acme of human knowledge.

Nothing could more forcibly demonstrate the intense hold which this treasured ideal of the "Year-term" had upon the minds of the early ruling classes of Egypt, for not only did they build the pyramids to realize that ideal, but they actually built up their oldest chronicle of the first 30 Dynasties to signify their national pride and glory in this knowledge of the Year period, as the 36525 Total clearly indicates:—

1st.—Their CENTURY of Years = 36525 days.

2nd.—The length of the Year by $\frac{36525}{100}$ = 365·25 days.

3rd.—The renowned "Sothic Cycle," because 36525 divided by the pyramid number 25 = 1461 Years.

(The pyramid cubit = 25" symbolised the 365¼ days' Year; and the pyramid's 5 sides × 5 angles = 25; the square of 5—the digits of the hand—also = 25;—Further, the astronomical reason was that after 25 Years of 365 days the lunations (moons) again begin their cycles on the same days, so the 36525 combines the two great cycles of the Sun and Moon.)

The 1461 Years is the great final Year or Time factor discovered by the pyramid priests, who, finding by close observation that 1461 of their public 365 day "Years" equalled 1460 Solar Years of 365¼ days, called 365¼ × 4 = 1461 Years the "Sothic Cycle," because in those later Egyptian Times the Year was gauged by the Helical rising of the star Sothis, now called "Sirius," the Dog-star. During that cycle the vague 365 day Year again accorded with the Seasons, which in the 1461 Years of the "Sothic Period" had gradually drifted through every part of the vague Year.

That drifting had greatly hindered and unhinged their observations, whilst the then unknown "precession of the Equinoxes" still more obscured their investigations, hence the great length of time needed to find out the Year's length need not surprise us.

The grouping of Days, Months, and Years together seems to us very inconsistent, but appears more excusable when we remember the great difficulties old chroniclers had to contend with from conflicting traditional accounts, defective writing, losses by death, fire, and wars (which often caused the death of or banished literary men over long periods), when learned persons were rare and their thoughts fettered by old habits.

MOSES as a STATESMAN publicly applies his YEAR KNOWLEDGE to make the ISRAELITES a GREAT NATION.

The existence of that Ancient Chronicle is further striking evidence of the intense hold this year knowledge had upon the ancient Egyptians, and emphatically proves my contention that the original term "year" was first applied to those shorter periods of Time, by which the early men counted their lengths of lives, etc.

That vague and mythic use of the word "Years" as having successively meant days, months, and varying periods of months, must have been known to Moses through his being "learned in all the wisdom of the Egyptians": but there was not room in his terse records of early civilization for dealing with such unwieldy problems. He was not like some of our newspaper writers of to-day, given to daily scribbling out column upon column of light reading on all manner of subjects with an air of authority as though they had spent a life-time in research upon everything they write upon, and yet which if analysed from time to time so frequently stultifies or conflicts with their previously expressed views.

Moses was not, like some of our own and many Continental editors, given to indiscreetly fanning the flame of racial and international hatred for their own miserable, selfish, money-grubbing ends—regardless of the people they gull and the ill-will and suffering they cause. He was a man of tact, who, by high-minded, straightforward, and righteous diplomacy delivered his people out of the hands of the then most powerful empire in the world, and from oppression unparalleled in history, without losing one of his countrymen's lives during the Exodus. No leader of men ever before or since has so skilfully solved such a great inter-racial problem.

Moses in writing Genesis seems to have purposely avoided thorny questions, and rightly applied his abilities to giving such a concise and graphic account of what he thought the common people should understand, that no later writer has been able to substantially improve upon his record.

He was neither writing a scientific treatise nor a fully detailed historical account, but having learned mathematics from the Egyptians "to train his mind for the unprejudiced reception of truth" (Philo v.m.,i.5) he discerned and wrote the gist of what was desirable to satisfy the latest enquiries of his day. The value of his work is proved by the fact of his records having lived down to the present day, and there is little doubt but that they will be even more cherished through future generations.

At what period the author of the first 12 months' Year lived we cannot yet say, though the exceptionally well-defined circumstances connected with Mr. Rhind's finding of the Thebes Mummy, crowned by the 12-leaved wreath, in the great granite Sarcophagus, give some ground for hope that the approximate date may be disclosed to us on further investigation by Egyptologists.

The 12-leaved gold wreath found in the Tomb at Thebes by Mr. Rhind seems to be an interesting relic of the Ancient Egyptian year. His "Thebes and its Tombs, etc.," (published by Messrs. Longmans, 1862,) on plate VI., illustrates this chaplet wreath, as reproduced below, though I cannot find that anyone has yet explained its object or meaning:—

GOLD WREATH, ex THEBAN TOMB.

I think, however, that it most probably *crowned the brow of the original inventor of the 12 months' Year*, as the 12 entwined bay-tree leaves in gold (again the colour of the Sun and Moon) fixed on the never-ending circle, strikingly suggests the cycle of the first known 12 months' Year, which would inevitably be counted by 12 moons amounting to 354 days.

Further, that would be the most natural and appropriate Egyptian style of honouring the eminence of the deceased, just as the author of the Ancient British Monthly Calendar appears to have been likewise suitably decorated when appropriately buried in the primeval mound at Stonehenge, as shown in the Addenda.

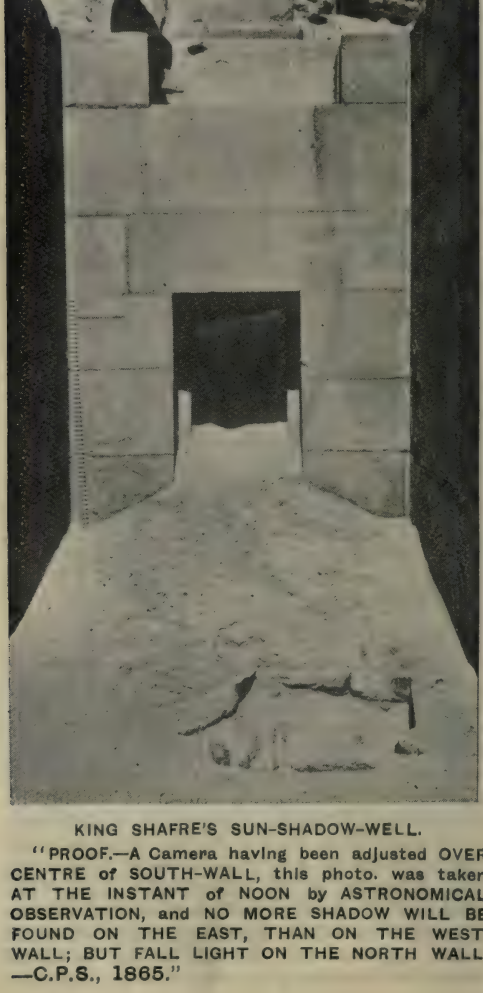
THE SUN-SHADOW-WELL at CHEOP'S TOMB.

The Tomb of King Shafre (who is perhaps better known by the name of Cheops), the reputed builder of the Great Pyramid, is situated on the South-East side of the Pyramid Hill.

It is a very remarkable fact that the chief feature of that Tomb is the Sun-Shadow-Well, a photo-print of which is reproduced below, by Professor Piazzi Smyth's kind permission, together with remarks in his own handwriting, duly signed, which appear upon his original negative, now in my possession.

Professor Piazzi Smyth's Endorsement, authenticating the transparent photo-plate, is as follows:—

"NORTH END of MERIDIAN GRANITE CHAMBER of KING SHAFRE on GREAT PYRAMID HILL, tested after 4,000 YEARS for truth of ASTRONOMICAL ORIENTATION, and found SENSIBLY PERFECT, In 1865."



KING SHAFRE'S SUN-SHADOW-WELL.

"PROOF.—A Camera having been adjusted OVER CENTRE of SOUTH-WALL, this photo. was taken AT THE INSTANT of NOON by ASTRONOMICAL OBSERVATION, and NO MORE SHADOW WILL BE FOUND ON THE EAST, THAN ON THE WEST, WALL; BUT FALL LIGHT ON THE NORTH WALL. —C.P.S., 1865."

KING SHAFRE'S SUN-WELL OBSERVATORY.

I found in the Great Pyramid Temple close by the Sphinx, King Shafre's "Sun-well" as shown opposite had evidently been designed to record Time by shadows. I also remembered the Historic shadow-well-method by which Eratosthenese and his colleague simultaneously gauged at Syene and Alexandria the Summer Solstice to form the first basis for measuring the size of the Earth as detailed up the left side of the map on page 22. My efforts to locate the former at Assouan (the modern name for Syene) did not succeed, because my time was too limited. Though the Nilometer Well on Elephantine Island looked suggestive, its Greek inscription, which I photographed, only referred to the then Ancient Nilometer being restored by the Greeks. The Temple Areas on Philæ's lovely Island seemed more likely, but now that it is partly flooded by the barrage-raised-Nile it becomes more difficult to locate the Sun-well of Eratosthenese.

Through the kind courtesy of Mr. Samuel Roberts, M.P. (then Lord Mayor of Sheffield), and Mrs. Roberts, who most considerately favoured me with their Dragoman to make a more protracted search for the Syene Sun-well,—at the risk of missing that memorable boat-trip (the last before the barrage piles blocked the Nile passage) we made together when "shooting the rapids" of the First Cataract,—I searched Philæ fairly over in the limited time, because I felt that the chances of locating it after the Nile water was raised over Philæ's lovely island would be remote.

Later, I wrote the Chief of the Egyptian Government Department of Antiquities to try if possible to locate the Sun-well before the Nile swamped our expectations, but as I have not so far heard of its location, there is only a faint hope that it may be located on the slope of the adjoining hills or plain on the mainland, where possibly, if it was regarded as a sacred spot, it may have been appropriated as a secret Tomb by a later Egyptian Ruler of that historic military and priestly territory.—It may even be near the greatest Obelisk still only three-parts hewn in the Granite Quarry there, which I barely had time to visit.

I did my best towards finding it after saving three years' holidays for that purpose, but was compelled to return by the post-boat next morning, fearing that my livelihood would be endangered by exceeding my leave.

I trust, however, that the Egyptian Government, some of our learned societies, or some of the wealthy persons who now so numerously visit glorious Egypt from all countries, will provide means for completing this search to locate and verify what appeals to me as a most interesting fact in scientific history, and next to the Pyramid record, the most potent evidence obtainable from history and location of that changing latitude and climate, dominating the whole race of mankind by raising and lowering energy to the uplifting and downfall of Empires.

My Pyramid experiments, proving the difference between the Great Pyramid's Ancient Equinoxial Slope and the present Equinoxial angle of the Sun, had impressed upon me the reality of its evidence of 7° to 8° change in Latitude, but the varying estimates of the Great Pyramid's age and former uncertain lengths of years, together with the facts I adduce elsewhere showing the greater speed of change on the Atlantic and Pacific Meridians, make it very difficult to locate the speed of change at the Pyramid: But here at Assouan we have the spot so well authenticated in Greek History, whence Eratosthenese, their great philosopher, made his vertical Sun-well to first test the size of the Earth by contrasting the Sun's position in the Zenith there at the Summer Solstice, with its corresponding 7° less Altitude at Alexandria; therefore, if we can locate that Sun-well, which clearly located the Tropic of Cancer about 276 B.C., and then measure the distance of about $\frac{2}{3}°$ = 46 miles South where the Sun now Zeniths at the Summer Solstice, it will form definite data.

At first sight this retrogression of $\frac{2}{3}°$ South in 2,180 years seems puzzling, until we realize the necessity for Open Sea Areas around the Pole to maintain the World's equilibrium, and further duly regard the irregular contour of the Ocean beds through which polar progressions must pass as we shall consider in detail later, when more world-wide evidences of change in Latitude have been obtained.

Then we may understand that this change of Latitude does not result in a geometric circle on any meridian, but is deflected and retarded by the resistance of the irregular land surfaces and changing polar location diverting the Ocean Currents, so that we must expect the polar course will turn in very irregular cycles and counter-cycles, which in many thousand years, whilst showing a general speedier progression during some thousands of years, will later show an apparent change when the Sun's more regular retrogression from its then Solstice height is compared with a similar test made from the same standpoint at the Solstice thousands of years earlier or later, so a retrogressive movement of Latitude may be expected when measured from the same fixed Sun-well at two widely different periods—one before and the other after the maximum curvature of the World-turning cycle has been reached.

We cannot conceive that such an exacting Astronomer as Eratosthenese could have made a mistake of $\frac{2}{3}°$ in fixing upon the site of his Sun-well, down which it was essential that the Sun should shine vertically and light up all the four sides of the Sun-well without any shadows, just as the North wall of Shafre's Sun-well at the Great Pyramid is.

This mark of the Tropic of Cancer at Syene would appeal to the cultured Greeks and their Philosophers, who we can naturally

imagine travelled to Syene to see the celebrated "Sun-well" registering the Tropic, as Tourists now do to its site (though now named Assouan) to see the wonders of Philæ and the latest engineering feat in the wonderful Nile Barrage. We might almost think that Syene became famous on that account, as well as for its Cataract and Rapids, therefore it may yet be possible to locate the Syene Sun-well through Greek literature—especially as the Nile formed the easy and direct travelling and trading route nearly due North and South, which doubtless led Eratosthenese to fix his Sun-well near the Nile banks, in the exact locality where the Sun shone overhead a few days each Summer Solstice before turning back from that place then in Latitude $23\frac{1}{2}°$—which now has distinctly changed to $24\frac{1}{6}$ within this historic period.

All up the Nile Valley it was noticeable how the Pylons in front of the great Temple Entrances appeared to slope to the almost vertical angle of the noon sun at the Summer Solstice—see S near the foot of page 38, where we may also see by the narrow pyramid section Z.s.s. to the right of S, a close approximation to the Meroe pyramids. There we see that the nearer pyramids are built to the Equator the more vertical must their slopes be. It was interesting to note that where there were not Obelisks to show the hourly time by shadows, there were vertical recesses cut into the front of these Pylons, as at Edfou, etc., for the evident purpose of socketing therein vertical shadow-poles to use like Obelisks to denote the daily time.

Indirect evidence of this method of recording the Seasonal position of the Sun was furnished by the "Sun-hole" through which, at the Monastery of the "Burning Bush" in Sinai, the Sunbeams register the "Summer Solstice" upon the shortest end of the Meridan-line, where the Priests point it out as the spot on which the "Burning Bush" appeared to Moses (Exodus III. v. 3).

My impression is fairly clear that the phenomenon of the non-burning bush appears naturally accounted for by the Sun shining through a bush direct upon a crystal-stone, from which the sunlight seems to fire to the eye, as I have seen in the desert, and often appears to us when the sun-rays strike distant windows at a crystal angle.

It may be of interest to here record my further searches for proofs of these early methods used by our ancestors for recording the Seasons, as I was interested in finding how the Churches had perpetuated this shadow and sun-beam method of recording the Seasons on the ground Meridian since the time of Moses.

The well-known Bible passage in 2 Kings XX. 8 to 11, first recording the use of the Sun-dial, reads as follows:—

"8. And Hezekiah said unto Isaiah, what "shall be the sign that the Lord will heal me, "and that I shall go up into the house of the "Lord the third day?"

"9. And Isaiah said, this sign shalt thou "have of the Lord, that the Lord will do the "thing that he hath spoken: shall the shadow "go forward ten degrees, or go back ten degrees?"

"10. And Hezekiah answered, It is a light "thing for the shadow to go down ten degrees: "nay, but let the shadow return backward ten "degrees."

"11. And Isaiah, the prophet, cried unto "the Lord, and he brought the shadow ten "degrees backward, by which it had gone down "in the dial of Ahaz."

Note that "he" in the last verse does not begin with a capital H to represent the Lord, for the probable reason that Isaiah arranged the tilting of the Dial 10° as could be very easily done in the interval either by tilting the style or skewing the dial-face, for be it noted, per verse 9, that Isaiah carefully restricted the option to 10° forward or backward—a small limit of deflection hardly noticeable on the style, but distinctly seen when magnified by the length of shadow to the edge of the dial numbers.

This artifice may have been justified as a means of impressing the young king Hezekiah to keep from the evil ways of his father Ahaz, and follow the wise priestly advice of Isaiah, to the advantage of the priests who already had received from Hezekiah abundant offerings, *e.g.*, 1,000 bullocks and 7,000 sheep, and influenced the princes to give 1,000 bullocks and 10,000 sheep, *vide* 2 Chronicles, XXXI., v. 24.

We note that "Oracles" were "practised "by the Hebrew Wizards *who peeped and "muttered* in the days of Isaiah," *vide* Ency. Britt., Vol. XIX., p. 727.

This came to my mind when at "Baalbeck" the guide led me down the subterranean passage from the private quarters of the High Priest to the hollow large statue, "Oracle," into which the priest's confederate used to climb, and answer Yea! or Nay! according to expediency when the kings used to bring presents when they came to consult the "Oracle" as to whether they should go up to fight the Assyrians, etc.

That was how the Priests "Worked the Oracle" in those illiterate times, when wrong-headed Kings like Ahaz needed checking by superstitious means to prevent national ruin, and preserve the priestly power over the people by specially dominating the King, whilst maintaining the priesthood's overawing power and easy life supported by the people's labours and contributions.

When we remember that even the cultured Greeks through many centuries about this period were mainly influenced by what they regarded as the indisputable assurance of their God Apollo, spoken through the "Oracles" at Delphi, etc. (until in course of years the "Oracle" through its Dorian priestly clique was found to persistently favour the Dorian Political Party), we need not wonder that those illiterate Kings and people

were thus misled, just as we might imagine the ignorant Red Indians might earlier have been misled into believing that they could conquer the United States, if their witch-doctors or priests had erected the New York Harbour Statue of Liberty (without their chiefs or people knowing it to be hollow and stair-wayed inside) to induce the chiefs and people to support the Priesthood by bringing donations when they came to ask the advice of that "Oracle" as to whether they should go on the war-path, as they would assuredly have done had the High Priest's confederate (specially chosen for his loud disguisable voice) through Liberty's mouth thundered forth *Yea!* when asked "shall we drive the pale-faced people into the sea?"

We do not know how large the dial of Ahaz was, but as we have not evidence of the more difficult vertical dials till later, it was persumably of the early horizontal type as later shown by the Obelisk Dial with 7 steps found at the foot of Cleopatra's Needle in Alexandria, though likely smaller than it or the later one reproduced from the garden photograph by Messrs. P. Henderson & Co., the Seedsmen, of New York, which, I think, fairly typifies the original uses of the Indian "Totems" and Vertical Stones throughout the World.

This is distinctly evidenced by the traditional name of "Indians' Clock," still maintained by the Mexican Indians for their Ancient Calendar Stone with its shadow-staffs as explained under the "Aztec Calendar Stone."

When we reflect that small horizontal dials were naturally made on circular discs of bronze, and by the ignorant were mystically regarded as occult time recorders, we can see how easy it was for Isaiah or a colleague to turn or slide the circular dial 10°, just as we could turn a loose dial on a clock 10° either way (*a mere* $1\frac{3}{4}$ *minutes* by the hour hand) without letting slow-minded people see how it was done.

As Isaiah's object was to impress Hezekiah for his own and the national good, we can hardly condemn the artifice which suited that stage of civilization then emerging from the primitive state when "Oracles" and priests were established to give counsel in perplexing cases—such as tribal dissensions, evil conduct of kings, etc.—where open efforts failed; then recourse was had to the "Oracle" worked by the priests, through whom the supposed commands of God were given. Therefore the character of the "Oracle" depended on the honor of the priests, whose offices tended to good so long as the priests strove for the common good and were noble-minded and more advanced than the people they led so frequently into greater unity, as instanced in the history of the Greeks.—Impartial investigators are impressed with the great power for good which resulted from the oracular declarations and exhortations of the Israelitish prophets, such as Samuel, Isaiah, Jeremiah, etc.

In like manner the Roman Catholic Church through the Papacy in the Middle Ages kept the Christian spirit alive, and provided what little educational work was done; therefore, though myself a Protestant and "Friend" (Quaker), I hold that the Roman Catholics are entitled to full credit for what they undoubtedly did towards securing such a large measure of unity and permanency to our civilisation in those unsettled times, even by some ritualistic and oracular methods similar to those of the Greek "Oracle Cults," which so far as they were wisely used decidedly helped the unity and progress of the Greeks, etc.

Before sailing from Alexandria in January, 1901, I had searched its Obelisk sites, but could not trace either the meridian-line or dial which I did not then know had been removed. My previous visit to Rome led me to return there in the hope that further personal investigations might lead to clearer evidence of Ancient Shadow-methods, as I knew that Egyptian Obelisks had been transported to Rome.

EGYPTIAN OBELISK IN ST. PETER'S SQUARE, ROME.
By Sir Norman Lockyer's kind permission.

The very limited time at my disposal led me to write Messrs. T. Cook & Sons (the Tourist Agents), Dr. Forbes Winslow (the renowned lecturer on Roman Antiquities), and Cardinal (then Monsignor) Stonor—all in Rome,—to enquire whether they could tell before my arrival, what evidence could be found in Rome of Shadow-methods of recording time, before Sun-dials. Their kind replies stating they could not trace any, showed how almost completely these primitive methods have been lost sight of through the universal substitution of the present more convenient clocks and watches.

Personal enquiries from other likely persons at Rome appeared futile. Then I began to search in my own way. Seeing the Obelisk in front of St. Peter's when driving past, I scanned the pavement where the meridian-line should be, and was delighted to see it plainly marked due North by a granite strip across the broad Square to the extreme Winter Solstice Shadow-tip evidenced by the January noon Shadow reaching beyond the Fountain. Stopping the carriage (despite that double fare penalty of Rome) to take a photograph, I was still more delighted to find that the Oval marble tablets (shown on next page in the upper photo-block) registered along the meridian-line the Shadow-lengths for each month, whilst, best of all, the Summer and Winter Solstice-lengths were duly engraved for their Tropical limits of Cancer and Capricornus.—

THERE WAS THE PROOF I WANTED.

Thus had the ancient shadow-methods been handed down to our time through this Egyptian Obelisk rightly placed in the centre of that most noted Square in the "Eternal City" of Rome.

Though I later found the Sun-hole in the Old Church of St. Paul's below the Railway Station at Rome, I felt that no further proof was needed beyond those clear cut meridian-lines in the floors of the Cathedrals at Milan, Antwerp, Rouen, Nimes, Durham, etc.—unless, indeed, the Egyptian Government are able by excavation to lay bare the meridian-line footing the Obelisk at "On" (Heliopolis) or below the middle of the North Slope of some of the Pyramids.

Probably such meridian-lines, if inlaid, have long since been taken up in barbaric times to form spear and arrow points, etc.

That thought impressed me, when at the Great Pyramid I saw the centre stone of the North foot casing had been removed.

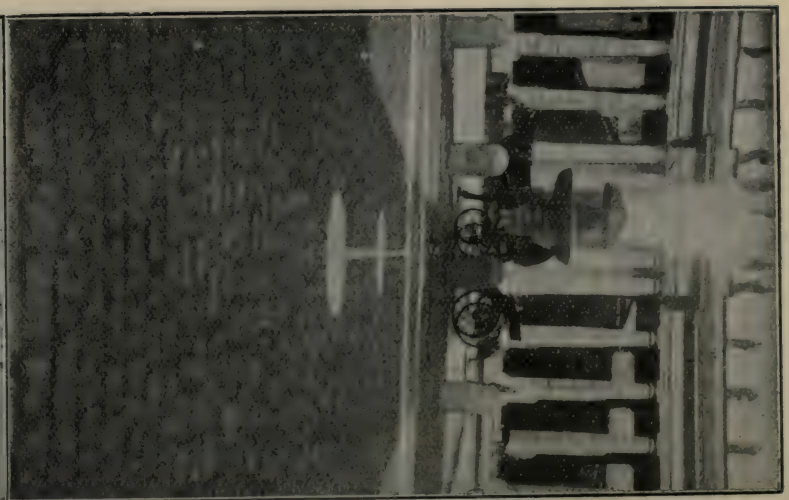
After returning to England in 1901 these researches and experiments were continued.

Whilst examining one of our oldest Churches at Alkborough, in Lincolnshire, and discussing shadow-methods with the Vicar just before going to press in June, 1904, he kindly directed my attention to the works of the late Rev. Wm. Hewson, formerly of Goathland, near Whitby, on the frontispiece of whose "Hebrew and Greek Scriptures" I was pleasantly surprised to find depicted the Sun-dial found at the foot of Cleopatra's Needle, as it furnishes still more completely the further proof required.

Whilst admiring Mr. Hewson's great labours on this sun-dial, etc., for which much credit is due to him, I cannot agree with many of his scriptural deductions therefrom, as this appears to be the simple useful dial I expected to find developed by the practical Egyptians from the study of Pyramid and Obelisk shadows.

Curiously enough this model of Cleopatra's Needle (not the Dial) was bought by me nearly 10 years ago, but I did not know of the present existence of its Dial which now enables us to realize the kind of dial erected by King Ahaz as already referred to in 2 Kings, XX., v. 8 to 11.

The EGYPTIAN OBELISK and FOUNTAIN in ST. PETER'S SQUARE, ROME



The SHADOW of the ROME OBELISK on the MERIDIAN-LINE with MONTHLY DISCS.

EGYPTIAN DIAL with SEVEN STEPS ex ALEXANDRIA.

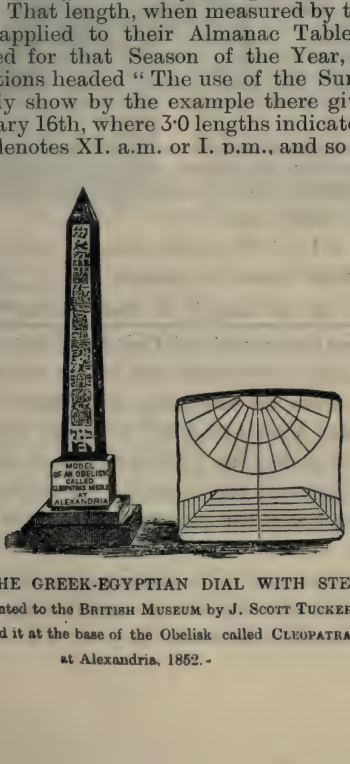
From the foregoing we may readily understand that the Greeks derived their dialling and mathematical knowledge from the great Egyptian University at Alexandria (where EUCLID lived and probably developed Euclid by geometrically studying proportionate shadows;) whence probably also the Romans derived if *not* the actual, at least the idea of their sun-dial wrongly fixed with style sloped for 4° less latitude than Rome to which it was transported about 263 B.C.

These, as depicted by the next photograph, seem to have been used from the earliest times. They appear upon the ancient sculptures of Egypt, Babylon, and almost all ancient nations who have left pictorial records.

Special note should be made of the fact that these staffs, pictured on Ancient Monuments, Druidical, etc., drawings, had straight tops—without the curved handles which appear on shepherds' crooks and our walking sticks—the reason being that such curve would have prevented the clear pointing of the essential shadow-tip.

They have since been so commonly shortened and degenerated into walking-sticks, that when seen in ancient records we are apt to regard them as mere walking-sticks; whereas reference to old Almanacs, such as that for the year 1712, reproduced on pink page 16, conclusively proves their prime use as "Travellers' Sun-dials," to tell the time of day by the varying lengths of their shadows.

The staves were notched into 100 parts—cut more deeply and numbered at each 10, 20, 30, etc. The rod held erect in the sun cast a shadow-length noted by the spot where its tip fell. That length, when measured by the rod, was applied to their Almanac Tables then carried for that Season of the Year, as the directions headed "The use of the Sun-dial" plainly show by the example there given for January 16th, where 3·0 lengths indicate noon; 3·21 denotes XI. a.m. or I. p.m., and so forth.



THE GREEK-EGYPTIAN DIAL WITH STEPS.

Presented to the BRITISH MUSEUM by J. SCOTT TUCKER, Esq.,
Who found it at the base of the Obelisk called CLEOPATRA'S NEEDLE,
at Alexandria, 1852.

MERIDIAN NOON on MAY 20th, observed by the writer in St. Mary's Abbey, YORK, by the Shadow's ·59 LENGTH of the SHADOW-ROD, as easily measured by the eye, or laying down the rod as per pink page 16.

We can trace them right through the Middle-Ages, when Travellers and Monks like "Friar Tuck" used them, down to the present time, when people in remote parts still use staffs, or their own shadow-lengths measured by their feet as my great-grandfather did, and as the following authenticated record proves that the Arabs had so generally continued to do in Egypt down past ages almost to the present time.

EXCERPT from MEMOIRS OF EGYPT by the FRENCH EXPEDITION of Scientific Men following General Bonaparte's Campaign, 1798 and 1799.

Translated by R. Phillips, London, 1800.

Page 294.—"The Arabs measure their day by "the stated times for prayers. They measure "Time by the Length of their Shadow: the "Shadow is measured with their naked feet, which "they place alternately one before the other. "Their rules for estimating are: that in the "Summer Solstice mid-day is 1 foot from the "vertical point; that in Winter at the same hour "the Shadow is 9 feet in length: that in Summer "the Shadow which answers to the middle point "of the interval from noon to sunset is 7 feet "beyond the place of the Shadow at noon. These "measurements are exactly conformable to the "Latitude of the Country."

We know that there is a fixed ratio between the different lengths of erect staffs and the lengths of the shadows which the sun-light casts from them at different angles of elevation and Latitude respectively; but early men could only find out that ratio (which we tabulate by figures in our books of mathematical tables, as the *co-tangent*) by very protracted geometrical experiments, because it was then impossible to do it by numbers, which were developed at a much later period.

During later years, the science of "Dialling" (as abundantly evidenced in Almanacs before watches became common) so far developed, that Small pocket "Sun-dials" embodying a compass like the following, became available and were largely used. In many of these the vertical shadow-pin gradually gave place to the Sun-dial Style photographed in the first figure, but cheaper ones with string "styles" fastened from the meridian to the centre of the vertical back became common as shown below.

POCKET SUN-DIALS as used before WATCHES.

These, which were all limited to use during sunshine, naturally gave place to the more useful constant time-keeping watches, which became common during the last century.

So we might go back tracing the connections and resemblances between the Greek cross-like Equinoxial Dial known as "Bed of Procrustes," "which made the Equinoxial day a standard "measure by which the Summer lengthening "and Winter shortening of the days was to be "computed."

Similarly we might trace the Chinese Horizontal Dial with Compass and Calendar, the Indian Zodiac, Ring Dial, etc., down to the Saxon Dial next produced.

The old SAXON DIAL at EDSTONE, YORKSHIRE.
(Near Kirbymoorside.)

The lower part shows the explanatory mathematical dialling lines which are specially interesting, as the present hour-lines of 60 minutes are compared with this Dial's hours of 80 minutes (1 hour 20 minutes of Equinoxial Time), being hours of Enoch based on 20° per hour. This system might be traced back to Enoch's ancient method of Dialling the 16 hours of the Longest Day (Summer Solstice) into 12 hours as the Arabs still continue to do from Sunrise to Sunset.

We may also note the French Detonating Dial marked for the Latitude of Lyons which had a burning glass, so that when inclined at the right focus upon a train of powder it fired a cannon fixed in front to give prompt notice of meridian-noon.

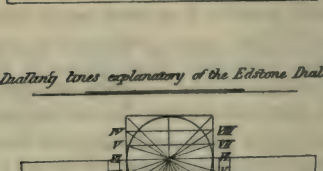
Finally we come to the ingenious half-cylindric Dial perfected by Professor Fisher, at Yale University, U.S.A., where I saw it last year, so completely adapted to every Latitude and Time wherever the Sun shines. That seemed specially interesting as a great improvement on the Dial of Berosus, the Chaldean, who lived about 325 B.C., and is reputed to have invented the semi-circular Dial "hollowed in a square and inclined according to "the climate," *vide* Vitruvius, lib. IX., chap. 9.

But before Sun-dials and the old complex Science of "Dialling" came into general use, more primitive Obelisks and other "Gnomons" were necessarily used as instanced later.

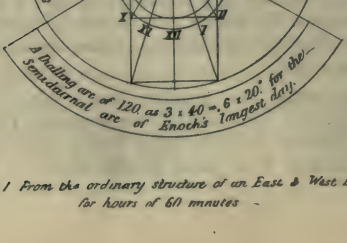
At present, though only about two generations have passed away since the general adoption of clocks and watches in country districts, the public in general have almost entirely forgotten the old sun-dial methods used by our ancestors for recording daily time. We have become so completely reliant upon our now cheap and abundant watches, which *always* give the time (whereas the

The Old Saxon Dial at Edstone.

The hours number 80 minutes or 1 hour 20 minutes of Equinoctial time being hours of Enoch or 20° to an hour



Dialling lines explanatory of the Edstone Dial



N° 1 From the ordinary structure of an East & West Dial for hours of 60 minutes

sun-dial only did so when the sun shone), that only the Antiquaries and curious passers now notice the sun-dials which have so recently passed out of use.

Seeing that this rapid transition has so quickly swept away the old Time customs handed down through so many centuries, we need not wonder that the pyramid system of finding Time 5,000 years ago, has been obliterated by the subsequent development of handier instruments, such as Obelisks, Sun-dials, Clocks, Watches, etc.

Sir Norman Lockyer, in his "Dawn of Astronomy," gives much interesting information as to the orientation of Egyptian temples, which he clearly shows were erected in the direction of the Amplitudes of special Stars for Star worship. But as these were built at much later dates than the Pyramids, we must go back much further for the Dawn of Astronomy, which, I believe, was long anterior even to the Pyramids, when prior mounds, poles and vertical stones were used to locate the Amplitudes.

With all due deference I believe that Sir Norman Lockyer's higher education has led him, like most University trained men (taught in the well-worn grooves of copied education), to under-estimate the difficulties of the early Egyptian, etc., investigators.

Reference to my Table of Solstitial Data, on page 72, shows that the differences between the Solstitial Declinations over 3 days is within 1′, therefore the total difference in Amplitude is about 1′ in 3 days, hence if we take the Sun's disc as 32′, we may say that its Amplitudes in Egypt only vary about $\frac{1}{32} \times \frac{1}{3} = \frac{1}{96}$ of the Sun's apparent disc as the inter-day difference during the 3 days. This is so minute that it could not possibly be discerned by the eye, and as then observers would be baffled by such infinitesimal differences, they could not thereby have traced the true length of the Year. They could only get an approximation by the Amplitudes before precise Astronomical instruments were available. Hence I cannot believe that the exact Year's length could be found by Amplitudes. That I submit was only possible after the Year's length was precisely determined by Pyramid Shadow Observations.

Sir Norman Lockyer states on his page 59 that "we must never forget that if Astronomy "is concerned in them (Temples) at all, we "have to deal with the Observations at the "rising and setting of the heavenly bodies; "*whereas the modern Astronomer cares little* "*for these risings and settings, but deals only* "*with them on the meridian.*"

That, I venture to say, is not applicable to the much earlier Pyramids, which appear from demonstrations herein to have been expressly intended for meridian shadow observations.

Sir Norman Lockyer's note on page 358 that the Pyramids are orientated to the East and West appears misleading, as the conclusive evidence of their North orientation observatory

passages proves that they were specially orientated to the meridian, *i.e.*, North and South, to make out the Equinoxes, first located thereby.

I cannot admit his page 61 statement that the stars would be first observed, as all the earliest records point to Sun worship, and the natural mind would be incapable of suborning the tiny stars to the infinitely greater Sun, which they regarded as the giver of Life and most powerful force of Nature.

The easy assumption that the Solstices and Equinoxes were truly located by the Amplitudes seems to be impracticable beyond such rough approximation as Jacob's method could give, whilst early men inevitably clung to Sun Observations.

As the Sun seemed to cause the Seasons, and men looked from effect to cause, it seems far more probable that the Sun's Seasonal Changes of Noon Elevations were earlier noted by pyramid observers on the meridian, as the comparative basis of subsequent astronomical observations continually required.

I believe that further investigations will show that both Star Observation and Star Orientation of Temples necessitated a prior introduction of a "SYSTEM OF TIME" best derived from Pyramid and Obelisk Shadows.

Before it was practicable to take and record reliable observations, it was essential that fixed time and equal hours should be used, as the Moon, Planets and Stars were passing the meridian at all hours and times.

A scientific Friend (whom I had told that my experiments with rod and pyramid shadows convinced me that they were the best available means which early men could adopt to trace out the year, and that I was testing my seemingly certain conclusion by the light which old book records might shed upon ancient astronomical methods) very kindly suggested in the course of conversation, that *Whewell's History of the Inductive Sciences* (1837) would test my theory. Though nearly all the foregoing was stereotyped, I delayed this issue to examine that book, and was astonished to find that its evidence, with others, so completely supported my theory, as shown by the following extracts:—

"The Arabs alone, who practice neither agriculture nor navigation, have a year depending upon the moon only; and borrow the word from other languages, when they speak of the solar year."—*Whewell's History of the Inductive Sciences*, page 113.

"The South American Indians, the Koussa Caffres and Hottentots, and the natives of New Holland, all of whom are said to be unable to reckon further than the fingers of their hands and feet, cannot include, in their notion of a year, the fact of its consisting of 365 days as we do. This fact is not likely to have been known to any nation except those advanced far beyond the earliest scientific process traced in human history—the formation of a method of designating successive numbers to an indefinite extent by means of names framed according to the decimal, quinary or vigenary scale."—*Whewell*, page 126.

ANGULAR DEGREES derived by the SHADOWS OF GNOMONS (Obelisks).

"Angular distances are most simply expressed by the intercepted portion of a circumference described about the angular point. The use of the 'Gnomon' might lead to the determination of the angle by the graphical methods of geometry; but the numerical expression of the circumference required some progress in trigonometry—*e.g.*, a table of the tangents of angles."—*Whewell*, page 212.

MEASURE of the SUN'S DISTANCE.

"The explanation of the phases of the moon led to no result so remarkable as the attempt of Aristarchus of Samos —*who was the first to maintain that the Earth moves round the Sun*—(*about 270 B.C.*) to obtain from this doctrine a measure of the distance of the Sun as compared with that of the Moon. If the Moon was a perfectly smooth sphere, when she was exactly midway between the new and full in position (that is a quadrant from the Sun), she would be somewhat more than a half-Moon; and the place when she was 'dichotomised' (that is, was an exact semi-circle, the bright part being bounded by a straight line), would depend upon the Sun's distance from the earth. Aristarchus endeavoured to fix the exact place of this dichotomy; but the irregularity of the edge which bounds the bright part of the Sun, and the difficulty of measuring with accuracy, by means then in use, either the precise time, when the boundary was most nearly a straight line or the exact distance of the Moon from the Sun at that time, rendered his conclusion false and valueless. He collected that the sun is at eighteen times the distance of the moon from us; we know that it is at 400 times the moon's distance."—*Whewell*, page 156.

APPARENT DISTANCES between the STARS.

"The estimation of distances among the stars by the eye, is an extremely inexact process. In some of the ancient observations, however, this appears to be the method employed; and stars are described as being *a 'cubit' or 'two cubits'* from other stars."—*Whewell*, page 198.

"A method of determining the positions of the stars susceptible of a little more exactness than the former is the use of alineations, already noticed in speaking of Hipparchus's catalogue. Thus, a straight line passing through two stars of the Great Bear passes also through the Pole-Star; this is, indeed, even now a method usually employed to enable us to readily fix on the pole-star; and the two stars, B and A of Ursa Major, are hence often called 'the pointers.'"

SOLSTICES traced by SHADOWS to FIND the YEAR.

"But nothing like accurate measurements of any portions of the sky were obtained till Astronomers adopted the method of making visual coincidences of the objects with fixed instruments, either by means of 'shadows or sights.'"

"Probably the oldest and most obvious measurements of the positions of the heavenly bodies were those in which the elevation of the Sun was determined by comparing the length of the shadow of an upright staff or 'Gnomon,' with the length of the staff itself. 'It appears, from a memoir of Gautil, first printed in the *Connaissance des Tempis* for 1809, that, at the lower town of Loyang (China), now called Hon-an-fou, Tchon-kong, found the length of the shadow of the Gnomon, at the Summer Solstice, equal to one foot and a half, the Gnomon itself being eight feet in length.' This was about 1100 B.C. The Greeks, at an early period, used the same method. Strabo says that 'Byzantium and Marseilles are on the same parallel of latitude, because the shadows at those places have the same proportion to the Gnomon according to the statement of Hipparchus, who follows Pytheas."—*Whewell*, 211.

About 2608 B.C., the Chinese Ruler Hoang-Ti built an Observatory to correct the Calendar which did not accord with the Seasons, and found that 12 moon cycles did not accord with the Solar Year.—That clearly goes back before the time the Chinese discovered the year's length, whereas the Egyptian records show that Khufu (now called Cheops) built the Great Pyramid about 3733 B.C., or over 1,000 years earlier.

The well-known and authenticated instance of the two Chinese official astronomers, Ho and Hi, who had their heads cut off, about 2400 B.C., *because they failed to predict an Eclipse of the Sun*—shows how strongly the Princes insisted upon their observers watching the celestial phenomena with the object of ascertaining the true length of the Year, *for without that knowledge they could not be expected to foretell an eclipse.*

USE of GNOMONS or OBELISKS.

About 1100 B.C., the Chinese at Loyang observed very closely the Summer and Winter Solstices, and determined the obliquity of the ecliptic as 23° 54′.

Eratosthenes found about 276 B.C. that Syene (South of Egypt) was under the Tropic, because there at noon on the Summer Solstice the gnomon gave no shadow, and the Sun's rays illuminated the bottom of the deep Sun-well.

Pliny, *ii.* 72, recorded that "the shadow of the dial, which they call the gnomon in Egypt, at noon-tide in the *Equinoxial day* is little more in length than half the gnomon."

"Boyle's Works," V. 398, refers to "one of those *gnomonic* instruments that show at once the place of the Sun in the Zodiac, his declination from the Equator, the day of the month, the length of the day, etc." (in that locality)——

Both the above are ex *Gnomon* in the *Century Dictionary*.

The former most distinctly confirms the results of my "shadow-grams" on pages 54 and 56, where the Equinoxial noon shadow is ·60 of the pyramid heights.—Further, the significant recording of the *Equinoxial day's noon shadow length* confirms my conclusion that the Year's length was found by pyramid shadows at the *Equinox*, which had traditionally become the important time for specially noting the gnomon's shadow.

About 1420 A.D., Ulugh Begh the Tartar Prince (grandson of the great Tamerlane), found by means of a gnomon 180 ft. high the obliquity of the Ecliptic = 23° 30′ and the Precession of the Equinoxes 1° in 70 years. [Note it was his grandfather, Tamerlane, who, in 1402 A.D., destroyed the great Syrian Sun Temple at Heliopolis, now called Baalbeck.]

All the foregoing evidence conclusively establishes the fact that in the Olden Times our ancestors unquestionably divided their daily Time by shadow-records.

The early literature of these and other Ancient Nations point decisively to the study of shadows as the method by which the Seasons were first determined. More might be given, but these should suffice.

The instances cited together with what I have already recorded of the exceptionally conclusive means which the Great Pyramid afforded for the detailed study of the yearly shadows, give us sufficient reliable data upon which we are justified in concluding that the Great Pyramid—and indeed the whole series of large pyramids—were expressly designed and used to find out the length of the Year by the study of their Seasonal Shadows to truly establish the Length of the Year as the basis of the Almanac required for Agricultural work.

I submit that as the design and all the essential facts connected with the Great Pyramid are herein shown to have been for the purpose of finding the true length of the Solar Year, and as that knowledge was of the utmost value to men who could keep it secret, we may, on the whole evidence, rightly conclude that the object of the pyramid builders is thus satisfactorily explained.

It is significant to note that as in Egypt, that other most noticeable ancient country of China kept the same secretive causes at work to keep other nations from gaining their early knowledge of the year. We all know how that exclusive policy has dominated the policy of China even down to the present time.

It is also very instructive to notice in the oldest records how tenaciously the Chinese, like other ancient nations, persisted in trying to find the length of the four Seasons by timing the Sun's turning points at the Solstices *by noting the lengths of the shadows cast from gnomons*, whereas I have already shown, that to find the true year, men had to locate and time the Sun's transit at the Equinoxes, which could best be done by the Pyramids, as the Egyptians actually did.

The Great Pyramid's shadow being too far out on the rugged rock area beyond the shadow floor when I was there in December, 1900, it was then too weak, and its tip or edge so imperfectly defined that definite measurements could not then be taken, because the sun was in its weakest season.

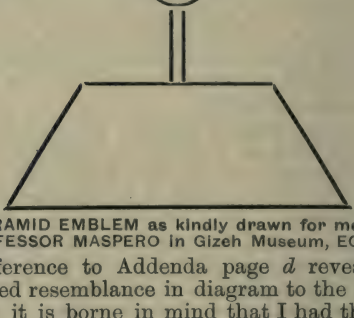
I, however, noticed the fact that the North centre casing-stone had long ago been removed from its position to the left of the one from which my Meridian-rod was photographed, and unfortunately the corresponding shadow-floor stones along the Meridian-line had also been removed, probably for the sake of the bronze or possibly gold Meridian-rod which I believe would be inlaid upon the floor to mark precise noon by the shadow, as the essential point of observation from which the Astronomical day has always been reckoned and Almanac or Seasonal times recorded, as evidenced by the meridian floor lines at Rome, Milan, Paris, Antwerp, Durham, etc., Cathedrals.

[I found stones similarly removed at the great Syrian Sun Temple of "Baalbeck," where those stupendous stones of about 1,000 tons each were built into that vast Temple-levelled area built for Sun observation as part of the worship of "Baal"—the Sun. There even the massive pillars were broken down by the Saracens to get the Bronze Rods (which held the stone-sections of the pillars together) to make spear-heads.]

Though disappointed at not finding the Pyramid's Meridian-rod, its cavity appeared evidence, yet I hoped to find traces at the Obelisks of "On," etc., but found the soil deposited by ages was too deep for me to excavate, and Government permission would be required.

It then seemed doubtful whether I should find direct evidence of the use of the Meridian-rod by such excavations, when such surface curios had been pillaged through the last 5,000 years, so I decided to search for more indirect proofs of shadow-methods on my return via Rome, etc., as detailed before the examples of Sun-dials, and on pages 78 A, etc.

My good friends, Mr. Duff (Junior), of Chiselhurst, London, and Aly Gabry (Pyramid Guide), kindly helped me in November, 1900, to photograph the Great Pyramid's Shadow, casing-stones, etc., as well as the Sphinx, after which I was most courteously received at the Gizeh Museum by Professor Maspero, who seemed much interested in my shadow theory as explaining the use of Pyramids. That he thought also explained the curious sun-disc emblem which was so generally found in the Pyramid Temples. He most kindly made a drawing of it for me as below, and promised to send me photographs of the very fine monolithic granite pyramids which adorned the corners of such Temples, as I had been much interested in seeing one being transported across the Desert as I rode back from Sakkarah.



PYRAMID EMBLEM as kindly drawn for me by PROFESSOR MASPERO in Gizeh Museum, EGYPT.

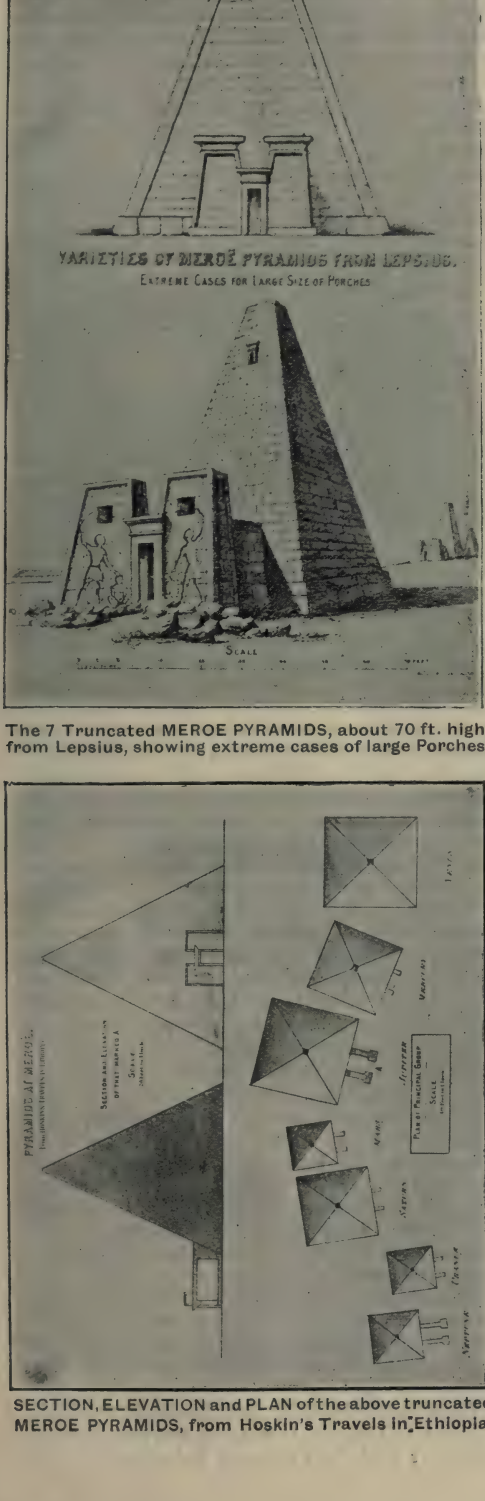
Reference to Addenda page *d* reveals its marked resemblance in diagram to the above, when it is borne in mind that I had there to show three sun-discs at distended angles, each of which in due season would appear from the sighting points to be disced on the pole top as there and here shown.

As I had printed the Silbury Hill section on Addenda page *d* in the previous year showing the result of my Wiltshire investigations, the sight of that emblem sketch confirmed my previous views and also led me to conclude that the smaller pyramids at Meroe were truncated, because their flat-topped areas had been used to erect thereon a "Sun-sighting Staff" to thereby locate the Seasons by observations raised to that increased height, whilst saving the immense extra labours otherwise needed to build a complete pyramid to that duplicate height.

I therefore felt satisfied with the days' work, even though a wily Arab stole my Camera with all my Pyramid and Italian photographs, from the carriage whilst Professor Maspero was so considerately helping me. (Should any visitor to Egypt have bought my lost 5″ by 4″ Kodak, I should be glad to receive my pyramid casing-stone photographs therefrom, though I fear they may be spoilt.)

The Pyramid Emblem so well expressed the contracted pyramid idea that it appeared specially significant.

As my berth was already booked up the Nile to the First Cataract (Assouan), it appeared desirable that I should proceed 1° further South to take observations at the Meroe Pyramids.



The 7 Truncated MEROE PYRAMIDS, about 70 ft. high, from Lepsius, showing extreme cases of large Porches.

N.B.—The names inserted below each pyramid's plan are merely suggested by me. Though I have not been privileged to see them, the 7 Pyramids called to mind the Babylonian Temple of the SEVEN PLANETS. The truly orientated one in the right corner, marked "Venus," appears to have been the premier one used for exact observations, as it has not any porch in which the dead were placed, or offerings deposited by persons ministering to departed souls, as was customary in Ancient Egyptian Tombs.

PYRAMIDS of MEROE.

These are situated about 17° No. Lat., and 34° E. Long., beyond the African side of the Red Sea, nearly opposite Mecca. As the Caravan Route from Babylonia passed through Mecca and thence by these Pyramids to Central Africa they were probably used as Observatories by priestly settlers from Egypt or Babylonia.

The large porches indicate the usual Eastern method of telescopically focussing the light of the rising sun upon the jewelled breastplate worn by the high priest at sacred festivals ranging between the Winter and Summer Solstices. The central point being directed to the Equinoxes by the *unporched* pyramid I have lettered "Venus," as the most brilliant planet typifying the birth of Spring at the Equinox.

As that was the pyramid used daily for time record by shadows, measured on the meridian to locate the Seasons it was necessarily placed square with the four cardinal points of the compass.

I shall be interested if any traveller visiting them and reaching their summits, will kindly inform me whether the truncated tops are solid, or whether there are traces of a socket hole for a sighting staff being placed on each as illustrated by Silbury Hill, in the "Addenda."

I had been so discouraged by Sir Francis Wingate's (The Sirdar's) curt refusal to facilitate my visit to the "Pyramids of Meroe" (which in the presence of ladies in his office he persisted in saying did not exist—although I had photographs of them, as produced on page 195), that I could not do more, especially as being a poor man I was unable to bear the expense of an escort. I sadly knew that scant courtesy was to be expected from some of our arrogant military officers, who appear to be ruining our Army by failing to understand the human nature of their men who are often less considered than their horses. How can such arrogance inspire their men with respect or confidence in their officers?

Is there need for wonder that private soldiers do not now advise their home companions to join the Army, as they used to do under noble leaders like the late General Wauchope who was always approachable and honoured by his men?

Unfortunately that section of the Nile beyond Assouan was then under military control.

Sir Francis Wingate, as then Governor of the Soudan, should have known of these historic Monuments so conspicuously seen from the Nile about 150 miles north of Khartoum. As martial law prevailed he had the power to prevent me going, but as the servant of the British Crown, he should treat the British Taxpayers, who provide his pay, with respect or even consideration under such circumstances.

Whilst my respect for the British Military Officers was thus lowered, it seems to have been fortunate that I was thus turned back, as otherwise I could not have spared the time to go through Syria where it was my good fortune to accidentally meet Professor G. Fredk. Wright, of Oberlin, U.S.A., at Beyrout (Beirut) and tour with him through Palestine.

I particularly wished to investigate the Meroe Pyramids, because their truncated tops and absence of any apex indicated a more primitive form of observatory like Silbury Hill (see Addenda), and might enable us to trace the Arabic development of the pyramid system back to the Euphrates Valley.

But as the groups of Pyramids at Meroe, Gibel Barkal, Nourri, etc., in Ethiopia, rarely exceed 100 feet in height and do not appear to be of such great antiquity as those of Lower Egypt, I probably did not miss much by having to turn back and being compelled to revert to the earliest Egyptian Pyramid of Medum, which seems to form the connecting link between the Chaldean and Egyptian Pyramids, as will be shown after the Chaldean Pyramids have been explained.

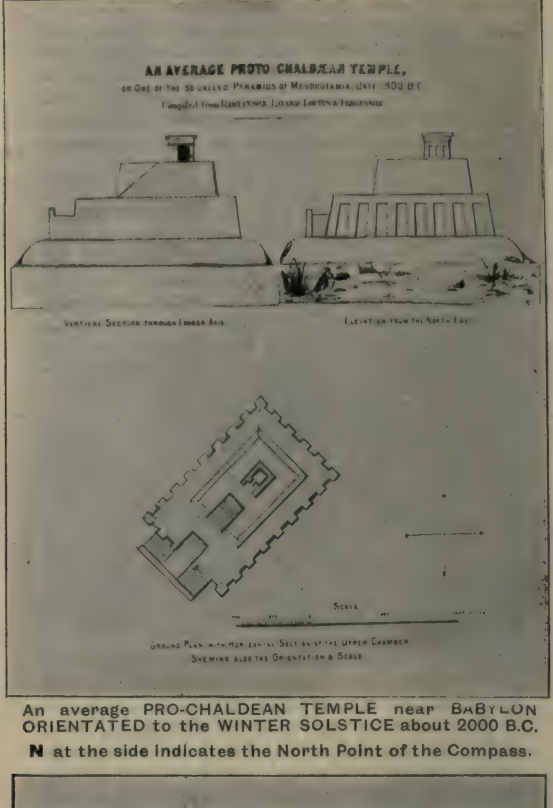
The 7 truncated Meroe Pyramids reproduced on page 195 from Mr. St. John Vincent Day's "Plates and Notes on Pyramids" (Edmonston and Douglas, Edinburgh, 1869), together with my recollection of the Chaldean Temple of the SEVEN PLANETS, led me to suspect that the earlier and more primitive Assyrian or Chaldean Pyramids might have originated the Egyptian idea, and led the Egyptians to improve upon it.

It will therefore be better to deal with the Assyrian or Chaldean Pyramids before reverting to the Medum Pyramid.

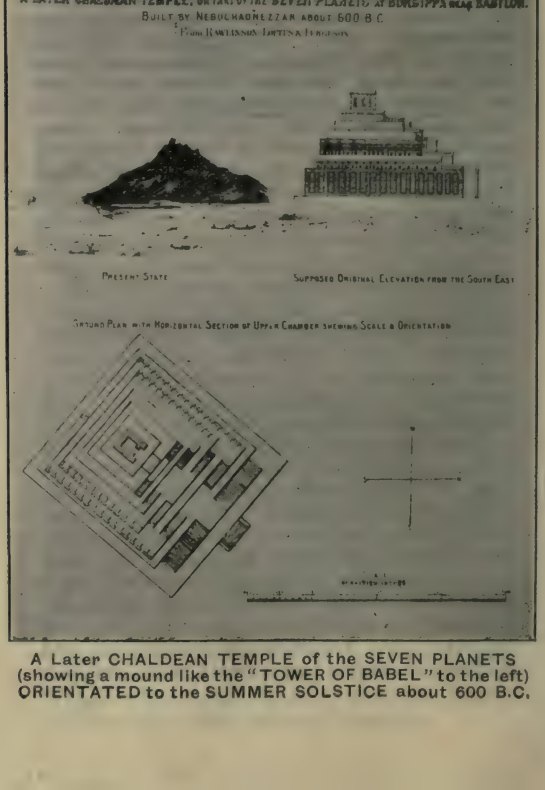
The ruins of the Ancient Chaldean, etc., Pyramids near later Babylon have led many Astronomers, such as the late Professor Piazzi Smyth, R. A. Procter and others, to disparage Chaldean pyramid efforts largely because of their supposed defective orientation; but my later investigations pointedly indicate that **whereas the Egyptians from Medum Northwards developed the higher and much truer method of Meridian observation by their compass-pointed pyramids, the earlier Chaldeans in their pyramid efforts seem to have adhered to the more primitive Amplitude method,** as may be readily seen from the two reproductions of representative Chaldean Pyramids next diagrammed with their plans to show their orientation to the "Sun-rise" at the Amplitude of the Winter and Summer Solstices respectively which first attracted attention.—(The Egyptians improved upon Babylonian ideas, as the Greeks similarly developed the ideas they later received from Egyptian scholars).

These may be better understood by reverting to my page 154–*l* explanation of the Amplitude method as developed independently by Jacob.

The primitive nature of these earlier mud and brick structures accounts for their having perished in much earlier times than the more durable pyramids of the Egyptians, therefore there is little hope of our being able to obtain sufficiently precise details to outline the first of the series traditionally known as the "Tower of Babel," or exactly locate its site.



An average PRO-CHALDEAN TEMPLE near BABYLON
ORIENTATED to the WINTER SOLSTICE about 2000 B.C.
N at the side indicates the North Point of the Compass.


A LATER CHALDÆAN TEMPLE, OR TEMPLE OF THE "SEVEN PLANETS" AT BORSIPPA NEAR BABYLON.
Built by Nebuchadnezzar about 600 B.C.
Present State
Supposed Original Elevation from the South East
N

A Later CHALDEAN TEMPLE of the SEVEN PLANETS
(showing a mound like the "TOWER OF BABEL" to the left)
ORIENTATED to the SUMMER SOLSTICE about 600 B.C.

All the traditions tend to prove that it was terraced in some style probably similar to that of the later pyramids or temples outlined upon page 198.

Though those shown only appear to date back to about 2000 B.C., they indicate the style of building erected by the earlier settlers in the Euphrates Valley, as further evidenced by the more ancient terraced structures now being brought to notice by the explorers from Europe and America who are excavating the sites of Ancient Assyrian Cities, Temples and Pyramids.

The "Seven Planets" plan shows a ruined mound very like the Tower of Babel, the elevation and plan being drawn by Mr. St. John Vincent Day, C.E., but we may be fairly sure that the "Tower of Bel" or "Babel" was erected first, as Moses, when writing Genesis, most probably had the main facts of Chaldean, etc., history authenticated from the ancient Library records then in Egypt, to which he had access as an Egyptian prince.

He concisely wrote back the main traditional or historic facts. The Deluge was traditionally regarded as God's punishment for the wickedness of men, just as the burning of Sodom, and later the destruction of Pompeii, was believed to be caused by the out-pouring of God's wrath against the evils there rampant—as those who have seen the uncovered evidences of those licentious times might well believe.

Few people realise the overwhelming power which that fearful volcanic disaster at Pompeii in 79 A.D. exerted towards establishing the then new-born Christian worship of the Eternal Living God of Righteousness through Christ.

Moses being inflamed at the oppression of the Egyptians did not mention their great Pyramid, etc., works which clearly existed then. His thoughts were directed towards the Promised Land and the traditional wonders of Chaldea, which were glorified by all the descendants of Abraham who had heard of those wonderful towering erections, but probably had not seen them.

The name Bā-bel combines the two ancient names for Sun-worship—"Ba" being an abbreviation of "Baal," and "Bel" the contraction for "Belus," the chief Deity of the Babylonians and the name of the traditional founder of Babylon.

It is most probable that the Genesis account of the Tower of Babel is based on fact, and very likely it was never completed as traditional records and pictures imply, for the effort was likely beyond the strain which the then limited population could bear (just as the great Baalbeck stone was stranded on its way from the quarry), and as the toilers would be mainly ignorant or careless of the great priestly purpose of their labours, they apparently rebelled or were dispersed through sectional wranglings as the Bible records.

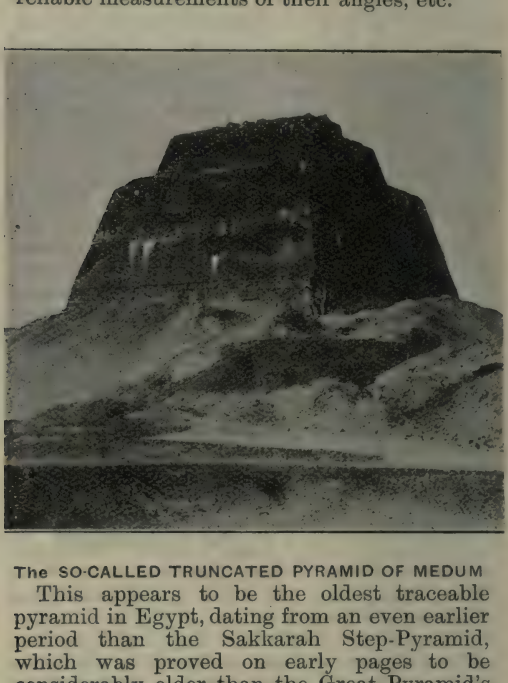
Antiquarians may be able later to go back further than the Tower of Babel and say whether those of India, etc., were later copied from the early settlers in the Euphrates Valley or were earlier.

PYRAMID of MEDUM In EGYPT.

The structure of the Indian Pyramids near Benares, etc., as mounds of earth and debris covered with bricks, being similar to that of the oldest Egyptian one at Medum, may indicate a common origin in the Euphrates Valley, or possibly they may have been developed independently as the Ancient Mexicans apparently did.

The Egyptian Pyramid at Medum, which now appears defectively orientated, is specially interesting because it appears to be a connecting link between the "Tower of Babel" and the "Great Pyramid," as intercourse between Arabia and Egypt was very easy across the narrow Red Sea.

Similarly there may have been a transfer of ideas from the builders of the 7 planet temple to those of the 7 planet pyramids of Meroe, and the Mud-brick Pyramids of Thebes and Howara referred to on page 151 of Petrie's "Pyramids and Temples of Gizeh." These with many others cannot be dealt with until we have more reliable measurements of their angles, etc.



The SO-CALLED TRUNCATED PYRAMID OF MEDUM

This appears to be the oldest traceable pyramid in Egypt, dating from an even earlier period than the Sakkarah Step-Pyramid, which was proved on early pages to be considerably older than the Great Pyramid's approximate age of 5,000 years.

The "Step Pyramid of Sakkarah" has a base which now departs some five or six degrees from the true points of the compass, and the Pyramid of Medum has a similar deflection, due in my opinion to the change of Latitude or Polar location as later explained.

Professor Flinders Petrie, by his valuable excavations and investigations, proved that this Pyramid at Medum was built as a successive series of super-posed *truncated* Pyramids, as indicated by the following reproduction from the article on "Architecture (Egyptian)" in the last (10th) Edition of the *Encyclopædia Britannica*.

Egyptian.

Taking the earliest structures first, we learn from Professor Flinders Petrie's work on *The Pyramids and Temples of Gizeh*, that the oldest pyramids known are those of Sakkara and Medum (Meidoun), and these were not only

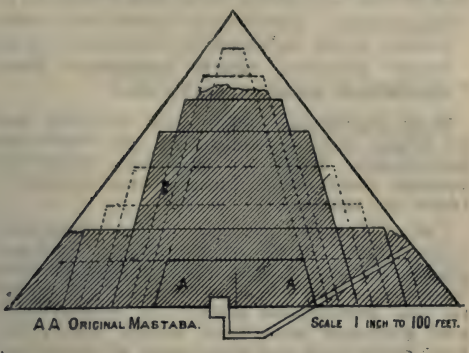


Fig. 1.—Pyramid of Medum (Meidoun).

of different construction from any of the others, but when the latter was completed it reached the form afterwards adopted in the true pyramids. The kernel of the Sakkara and Medum pyramids belong to the class known as mastaba tombs. The term mastaba (Arabic for "bench") has been given to the sloping-sided tombs, of about 76° angle and from 10 to 20 feet in height (Fig. 1). In their origin they are probably copies in stone of the crude brick dwellings of the Egyptians the walls of which must be much thicker at the bottom than at the top, to carry the superincumbent weight. Both the pyramids above named are known as cumulative or superposed mastabas[1]—*i.e.*, successive enlargements have been made to them, having been after each completion again enlarged by another coat of rough masonry with another fine polished casing outside. The pyramid of Sakkara was never completed, and has retained the stepped form which these successive casings gave to it. In the Medum pyramid the tower-like appearance, at present, of the centre portion is due to two of the lower enlargements having fallen away (Fig. 2). Before the final casing the successive enlargements had resulted in seven steps, the outer angles of which were pyramidal; the last process was to add a smooth casing to one slope from base to top. The angle thus formed was about 52°. These two pyramids are the only ones built in this way; in all the others the full size was settled from the first, though a change from the original size seems to have been made during its construction, in the third pyramid of Menkaura.

From Professor Flinders Petrie's measurements of the Great Pyramids, the original dimensions have now been ascertained exactly. The external dimensions of the first pyramid, that of Khufu, are 755 ft. 8 in. as the mean of the four sides, with an extreme difference of 1·7 of an inch. The height from the level of the artificial pavement round the pyramid to the apex was 481 ft. 4 in., and the angle of casing, 51·52°. In the second pyramid, Khafra, the lowest course was in granite, and had a vertical base 11 in. high, against which the artificial pavement was laid. The side dimensions were 706 ft. 3 in. as a mean, with an extreme difference of 5 in. The height was 472 ft., and the angle of casing 53·10°. The third pyramid, Menkaura, was never quite completed, the mean length of the sides was 346 ft., the height 215 ft. and the angle 51·10°. The lower portion of this pyramid was cased with granite to about one-fourth up, and the rough surface of the granite casing was never worked off. Part of the outer casing still remains on the second pyramid. The casing stones were not simply triangular blocks filling up the angles formed by the receding steps, but from 7 to 10 feet in depth, so that their bedding must have begun at the bottom

PYRAMID of MEDUM.

We are greatly indebted to Professor Flinders Petrie for this instructive diagram of the Medum Pyramid and conclusive evidence, that what he calls the "successive enlargements" have "been after each completion again enlarged by another coat of "rough masonry, **with another fine "polished casing outside."**

That significant fact now enables me to trace the evolution of the Pyramid Astronomy from its probable Assyrian source, through its characteristic gradations at Medum.

I have already proved by the Solstitial orientation of the Chaldean Temple plans, on page 198, that those Temple Observatories were respectively pointed to the Amplitude points of the Winter and Summer Solstices, which inevitably first attracted the attention of primitive men. Therefore, following that natural trend of reasoning [aided by the experience I had derived from years of observation of the Sunrise and Sunset points at the Solstices, which convinced me that the precise length of the Seasons and Year could not thereby be truly measured], it seemed that stern necessity would compel succeeding generations to desert the "Amplitude Method" and develop the "Meridian Method" of observation, to which they would be directed by observing that the lengths of shadows from their longer tent, etc., poles showed more readable gradations at the Solstices than shadows from shorter staffs, as evidenced by ancient records already quoted, and many others.

Naturally, therefore, the first efforts of embryo Meridian Observers of the Sun, would be directed to locate the Angle of the Sun's Elevation at the SUMMER SOLSTICE, when the Sunlight was brightest and its shadows therefore strongest.

Those early observers could not face the glare of the Sun for direct observation as we do by the telescopes; they were therefore compelled to resort to the surer and easier inverse method of observing and measuring the lengths of the Sun's Shadow at noon on the Shadow Floor Meridian.

That, I submit, explains the reason why the two oldest Pyramids of Medum and Sakkarah were built in successively finished terraces, each with polished sides, which were necessary to precisely register the Solstitial Angle of the Sun's rays at Mid-Summer, at the Meridian point shown by the meridian line along the middle of the North Shadow floor.

Professor Flinders Petrie's diagram, shown as a section on page 201, dots up a short line from the middle floor line, which, if later traceable up the centre of the North side and like the shadow grooves evidenced by the Temple at Edfou which I shall later explain, will prove of special significance.

The most notable and important feature of this earliest Egyptian Pyramid at Medum is disclosed by the successively polished and buried sides which sloped upwards to mark the Sun's then Altitude of about 75° at the Summer Solstice.

Professor Petrie refers to an angle of 76° for the Mastaba Tombs, which may thus be dated about 700 years later, but the existing measurements of this most Ancient Pyramid of Medum are not sufficiently accurate to enable us to give the precise angle of its polished Summer Solstice marking sides, **but it is sincerely hoped that Professor Petrie or Professor Maspero may be induced to make accurate measurements of this Oldest Pyramid,** as Professor Petrie so well did for the Great Pyramid as recorded for the reader's guidance in the last paragraph of the *Encyclopædia Britannica* reproduction on page 201. I request them to do so because this question is of such world-wide interest, and it is easy for them to measure when they regularly Winter in Egypt, whereas I cannot afford either the time or expense which they can readily induce the Egyptian Government as the right authority to bear. I have already borne more than I can afford, in view of the needs for the best education of my deserving children.

Until that can be done it is hardly practicable to determine with sufficient accuracy to *minutes* and *seconds*, the interesting angle of the successive polished Summer Solstice Slopes which my protractor shows as **75°. Therefore I can only work upon that 75° at present,** as all that series of polished Solstitial Slopes dotted upwards on the Medum Pyramid Section upon page 201 seem to be **75°,** especially where the full lines indicate the polished Mid-Summer Slopes.

The Pyramid of Riga, near Abusir, is stated by Vyse to have a slope of 75° 20′ (Petrie's Pyramids and Temples of Gizeh, page 147).

That 20′ beyond 75° seems due to its lower Latitude and different age, for although the Changing Latitude would *equally* affect any two pyramids *from the time the later one was erected*, the longer existence of the older pyramid would show a proportionately greater deviation of the Sun's present Equinoxial Angle from the original angle of that pyramid's slope if the speed of change was uniform ; but as we have reason to believe that the rate of change was much quicker 5,000 years ago, the probability is that the older pyramids show more than a proportionate speed of change during their earlier years.

Therefore that uncertain factor prevents our deriving the exact age of the Pyramid of Medum from its Slope, which needs increasing by its geographical distance of $\frac{1}{2}$° from the Great Pyramid, to a 75$\frac{1}{2}$° Solstice Slope, for comparison with the Great Pyramid's 52°

Equinoxial Slope to prove by the difference that the range of the Tropics and Arctic Circle 5,000 years ago was 23½″ from the Equator and Pole AS NOW, though the location of both the Equator and Poles (and consequently the Tropics and Arctic Circle) was then about 8° further South when measured in Egypt as evidenced later.

Readers may understand that better if they meantime accept my assurance that so far the best evidence proves that the Climatic Zones bounded by the angular distance of the Tropics and Arctic Circle to the Sun have remained the same, but that the Earth has turned Southward through those Zones about 8° down the Cairo Meridian.

If the reader will now refer to my fan-like diagram, at the foot of page 38, he may realise that at Cairo the Summer Solstice Elevation or Altitude of the Sun is now 83°, as shown by the Solstice line from O upwards through the 83° point marked S, therefore the present corresponding Summer Solstice Elevation of the Sun at Medum is 83½°.

That shows **8½°** more than the Medum Pyramid's Ancient SUMMER SOLSTICE SLOPE of **75°** which readers may insert midway between 70° and 80° upon the celestial arc, and also add the 52° mark of the Great Pyramid's Ancient Equinoxial Slope.

It is important to note at the same time, that although the present Latitude of Cairo is 30°, requiring a consequent Altitude of 60° for the Sun's present Equinoxial noon point, the Great Pyramid's Ancient Equinoxial Slope of 52° proves the strongest confirmatory evidence which human agencies could hope to find, of that 8½° change of Latitude in Egypt since the Medum Pyramid was built about 6,000 years ago—and therefore establishes the fact of an 8½° change in the Latitudes of the Earth, as well as 8½° change in the location of the Equator, Tropics, Polar Axis and the ARCTIC CIRCLE which bounds the range of the Arctic Climate with its Glaciating Icefields, thus diverted about 8½° further North as explained later.

Both these Independent definite Slopes of different systems of Astronomy at Medum and the Great Pyramid prove that the Sun there now rises about 8° higher than it did 5,000 or 6,000 years ago, and as the reader can easily compare by paper measure the 23½° difference between the Great Pyramid's 52° Equinoxial Slope and

the Medum Pyramid's 75½° comparative Solstitial Slope, he may see that it practically accords with the Tropical 23½° between the essential E and S lines of the "Tropical Fan" on page 38, and thereby doubly proves the gradual change of Latitude which has accumulated to 8° in about 5,600 years, or roughly 1° each 700 years—a speed only one-tenth of the "Precession of the Equinoxes" rate of 1° in nearly 72 years.

That debatable question of Changing Latitude, also known as "Polar Recession," must necessarily be dealt with to establish the difference between the present Equinoxial Elevation of the Sun at Cairo and the Sun's Elevation about 5,000 years ago, as defined by the Great Pyramid's Ancient Equinoxial Slope, in order to authenticate the fact that the Pyramids were built for the great and useful purpose of finding the Length of the Year. That requires such lengthy treatment that it must be deferred until I have, by the next few pages, further established the data explaining the evolution of the Pyramid system and substantiated this solution of the Pyramid problem.

Meantime readers are desired to carefully bear in mind this most significant Medum and Great Pyramid evidence of "Changing Latitude," as it seems the most important factor affecting humanity in the evolution of the World. They may rest assured that I will later substantiate that Change of Latitude by reasonable and impartial corroborative evidence from Geological, Astronomical and Historical established facts.

I therefore now return to explain that Pyramid evolution which apparently led to the successive step-like stages of development evidenced by the structure of the Ancient Medum Pyramid.

Here, bearing in mind the aforesaid similarity between the Pyramids of Medum and Sakkarah, I cannot do better than quote the following from the carefully reasoned opinion of Professor Flinders Petrie :—

"The Step-Pyramid, or Mastaba-Pyramid "of Sakkarah is of an oblong plan ; unlike any "pyramid, but similar to the Mastabas. "The Mastaba-el-Farun at Sakkarah is an "intermediate form, being as large as the "base of a Pyramid, but as oblong and low in "its proportion as a Mastaba. Now that the "name of King Unas has been found in one of "the Pyramids, it is evident that his name "occurring in the Mastaba-el-Farun merely "shows that he built it, probably as a base for "an Obelisk, such as is often seen in early "inscriptions representing a monument or "temple to Ra" (the Sun).—*Ex Petrie's "Pyramids and Temples of Gizeh," page 148.*

Reference to Professor Maspero's drawing of what has been named the "Pyramid Emblem" on page 194, shows the "Mastaba" as a truncated Pyramid, and upon its platform an Obelisk is represented with the Sun disced thereon at Meridian Noon—clearly typifying the Egyptian Meridian system of observation in its earliest stages.

That hurried hand-sketch by Professor Maspero cannot be applied to register the exact Summer Solstice Angle at Medum, as it was only intended to give a general idea of the Mastaba-like platform with its centralized Obelisk surmounted by the Sun disc, but I trust that the reader may thereby understand the first stage in the development of the Medum Pyramid, when the Sun would each day at noon appear disced on the Meridian over the Obelisk then erected in the middle of the lowest platform of the Medum Pyramid, when the then outside polished casing of the first platform only was built to the Summer Solstice Angle to mark the extreme Summer height of the Sun, which was thus yearly registered when shining sheer down that slope.

Very few years would suffice to show the inadequacy of that crude register of the Year's length kept by counting the days between each Mid-Summer's shortest shadow, and as the Observer's experiments with such shadows would easily prove that by doubling the height of the Mastaba they could double the length of the shadow to gain more accurate results, whilst they need only raise the central part of the structure, they would naturally cut down into the lower rubble to lay better foundations to bear the greater weight of material required to raise their next solid platform to the height then deemed advisable.

The better results thus obtained would prove to the successors of those early Astronomers, that by going higher, still greater accuracy could be obtained, therefore successive generations would raise this pyramidal pile by steps to the limit of their powers as restricted by the original pyramid base.

Then as the labour became too stupendous for them to reach higher from that original restricted base of the Pyramid, and their observations of the greatly increased daily range of shadow change at the Equinoxes led them to study the Sun's Equinoxial Angle they would be naturally led to either slope their Pyramid to the Equinox, or, as probably those who clung to the Solstice Slope method of research would be the old sages who held the power, the advocates of the Equinoxial Pyramid system would be ostracised and compelled to go to Dashoor or elsewhere to establish their new cult and find supporters to erect a new and better Observatory Pyramid.

That rivalry between the Solstitial and Equinoxial Cults and Advocates would probably continue over a long period, until ultimately the superior advantages of the Equinoxial Method would command general acceptance, and lead to those united and final efforts which raised the Great Pyramid.

Hence it seems very probable that the several casings and platforms of the Medum Pyramid may have been built at dates ranging from scores to hundreds of years apart, and the final Equinoxial Casing Stones may have been completed at a very much later date.

Indeed that seems to have been the case, for assuming that Professor Flinders Petrie's diagram is correct, my protractor shows the Equinoxial Angle of Medum's final slope as $53\frac{1}{2}°$, which may indicate that an experiment was there made with cheap local sloping material to follow the changing Latitude when the Equinoxial Angle of the Sun was $\frac{5,000 \text{ years}}{7·1°}$ = 704 years per degree × ($53\frac{1}{2}° - 52°$ Great Pyramid's Slope) = about 1,056 years after the Great Pyramid was built. But further excavation and exact measurements are needed before the facts, dates, etc., can be reliably determined.

That 7·1° later proved is the Sun's Declination from the present Equinoxial Point at Apparent Noon on March 3rd, when the shadow from the Great Pyramid's fixed Slope now registers that Declination of the Sun from the Celestial Equator which marks the Equinox.

But as the age of the first stage of the Medum Pyramid seems dependent upon the Ancient Summer Solstice Angle of 75°, whilst the Sun now there registers 83·5°, the change of Latitude appears to be 8·5°, which, in view of the Great Pyramid's change of 7·1° as later proved, would indicate by proportion the origin of this Medum Observatory in as 7·1° is to 8·5°, so is the 5,000 years' age of Great Pyramid to the about 5,990 or say 6,000 years' age of the Medum Pyramid's foundation, as approximated by the Solstitial Slope from its first truncated area or platform.

As each of the Medum Pyramid's complete Mastaba-like platforms was originally sloped with polished casing-stones, that seems to clearly indicate the line of progressive development which we should most naturally expect to find, as the pyramid priests observing the difficulty of differentiating the shadow with sufficient accuracy from the limited vertical height of its lowest platform, took the simplest means of adding to its height by building the next higher platform, which when still found insufficient led to others, until they were probably brought by degrees to conclude that the Equinoxial Slope was essential.

Few persons recognise the great force and usefulness of Geometric reasoning, despite the strongest possible evidence of its power in developing Ancient Greek Culture, and the fact that our best Engineers and University men of to-day have to resort to Geometry, under the new name of "Graphic Statics," to best calculate the strains of bridges and measure quantities for large embankments, earth works, etc.

When we remember that the Ancient Egyptian methods of mathematical reasoning were, like the Chinese and other Ancient Races, almost entirely based upon "Geometry" as the "Science of Earth-measurement," and that its most famous factor was the study of the "right-angled triangle," *the hypothenuse of which registers the Slope of all pyramids* opposite their vertical heights and floor-lines, and always measured the shadow's edge from vertical erections, we may, by reference to

the Geometric ratios, etc., on page 100, easily imagine that the Pyramid Priests were led by small scale experiments to expect that the π Sloped Pyramid would supply the key to Astronomy and Geometry, and therefore when the Equinoxial Sun was found at noon to so slightly vary from the Slope which was thus proved to be imperfect, they reasoned that as the Sun was right, their Slope must be wrong, and therefore the error was due to their pyramid not having the exact slope, because it was located too far South.

Therefore it is very probable that they began to build their later and higher Observatory series of Pyramids by progressing slightly further Northwards.

The real cause of their difficulty was that they did not reach high enough at first, and failed in the supremely difficult task of fixing upon the true Equinoxial Slope, because, as herein later explained, the Pole of the Earth was at that time receding Northwards much more rapidly than now, as the rapid and forceful inroads of the Gulf Stream into the Polar Ice thus forced it to quickly retreat by melting from Northern Europe.

That changed the Latitude, and thus the true Equinoxial Slope of the Pyramid, far more rapidly than now, and as they could not ascertain its cause, but observed indications of that deflection of the Pyramid Slope, their successors tried to solve the problem by building later Pyramids further North, as may be seen by the Map on page 22, where the later series of Pyramids receded from Medum to Cairo. There the Pyramid Builders probably attained to sufficient accuracy and abandoned further efforts on finding it impossible to keep pace with the more rapidly changing Equinoxial Slope caused by the accelerated recession of the Pole and consequent Change of Latitude.

Professor Petrie, from the style of architecture, indicates that some of the Pyramids may be of later date than I think the progressive development of the Pyramids demonstrates. But as different Pyramid Cults may have lived at the same time, we cannot as yet fix the complete order of the Pyramid series.

With all due deference, it seems to me that when we are dealing with monuments say 5,000 to 6,000 years old, which are still on the surface so that we cannot register their age by layers of human dwellings and atmospheric deposits as at Babylon, we should not rely too much upon "style," when it is fairly obvious from the wonderful remains of Greek Architecture and Art still left to us, that the Greeks of over 2,000 years ago were in many points of style more perfect than we are with all the immense advantages of the accumulated educational and mechanical facilities transmitted down to us by books, etc., through all the intervening generations.

The Medum Pyramid is shown last because it appears to have been the earliest Egyptian attempt towards more precisely locating the Seasons by huge pyramid Observatories for the great rational purpose of ensuring regular crops of food, as we now do by Almanacs, since developed and made available for constant use.

After making the Obelisk Meridian enquiries at Rome in 1901, as already recorded, on my way home I wrote Professor Maspero (the very eminent Egyptologist, who is Chief of the Antiquities Department of the Egyptian Government and in charge of the famous Gizeh Museum) requesting him to kindly have the shadows photographed at noon on the Spring Equinox, which was the critical time when the receding shadows would have been easiest recorded and of the greatest value to the Egyptians. Unfortunately, Professor Maspero was then taking a holiday at his home in Paris, therefore my letter was re-directed to him from Egypt, and so lost the opportunity, as before he could give the precise written instructions required, the Pyramid's shadow had vanished for that season.

Knowing that it was almost impossible to catch the suddenly re-appearing shadow at the Autumnal Equinox, I then accepted Professor Maspero's very kind suggestion that Mr. J. E. Quibell, the Chief Inspector of Antiquities to the Egyptian Government, should see to the photographs being taken for me at the next Equinox. Meantime, correspondence with Prof. Flinders Petrie, of London, the well-known authority on pyramid measurements, etc., elicited the fact that the Pyramid's slope, though now defective through the casing stones having been removed, was not true to the present angle of the Sun's elevation at the Equinox, as "the Sun is at 60° altitude at the "Equinox, and it will be at 51° 51′ (the Great "Pyramid's original angle of slope) when 8° 9′ "South of the Equator on February 27th and "October 14th."

I accordingly arranged for photographs of the noon shadows to be taken on October 13th and 14th, but that proved too late as the first shadow had fallen within the day gauge at noon on October 11th, when the Sun was only 7·1° Declination from its corresponding Equinoxial Elevation. That, as also proved by the Spring observations below, was 1° short of Professor Petrie's estimated 8°, whereas the reduced Pyramid Slope through removal of the upper "casing stones" indicated that a little over 8° difference might have been expected.

As that 1° difference would be partly due to Refraction, etc., and the Ancient Egyptians had to depend upon the direct Shadow record, we should by the shadow record seek to gauge that angular difference of Latitude which I believe has developed between then and the present time from changing Latitude due to Polar, etc., causes as indicated later.

During February, 1902, arrangements were made with Mr. Quibell, through whom my written directions were given to Mr. Dozsay, the Great Pyramid photographer, who fortunately kept on watching for the receding shadow, which he photographed on March 2nd, noon, when the shadow was 4 ft. away from the foot of the Pyramid, and again, on March 3rd,

at noon, photographed the shadow-floor to prove that the shadow had shortened over 4 ft. in 24 hours (as mathematically proved on page 74) and then disappeared for the Summer.

Those photographic proofs are reproduced on page 78a, and I hold for inspection the original negatives duly endorsed as to dates, etc., by Mr. Dozsay, who deserves special thanks for so faithfully carrying out my particular request to continue watching until he photographed the Pyramid's shortest shadow.

Mr. Dozsay carefully packed up the negatives and photographs which were posted to me, but before they arrived I received a most considerate letter from Mr. Quibell (whom I most cordially thank) explaining that he had watched on February 26th, 27th and 28th, when the usually cloudless sky of Egypt was overcast at noon so that a sufficiently sharp shadow could not be seen, and as the February 27th time-limit predicted by Professor Petrie was passed, he gave it up, as naturally he did not question that great authority on the Pyramid's Slope.

That was discouraging after I had spent the month of November in Egypt when only one cloudlet appeared, and as it happened to shed a few drops of rain which spotted my Fez (Tarboosh) I kept that as a memento of the very unusual showerlet of Rain in Egypt.

Having some doubts as to whether the change of Latitude could have been so great as 8° to drift the shadow back to February 27th, I had long before expressly written Mr. Dozsay to continue watching as he so fortunately did to March 3rd, when he completed the essential photographs which so definitely establish my theory. I was therefore highly pleased to receive them, as they enable me to approximately locate and measure this most important and World-wide 7·1° Change of Latitude, thus clearly evidenced by the fact that whereas the Great Pyramid's Shortest Equinoxial Noon Shadow fell when the Sun's Declination was 0° at the Equinox on March 21st about 5,000 years ago, its Slope is now so far deflected that the Shortest Shadow now falls on March 3rd, when our Astronomical and Nautical Almanacs plainly demonstrate that the Sun's Declination is 7·1°.

MARK THE VAST SIGNIFICANCE OF THAT 7·1° CHANGE OF LATITUDE WHICH DURING 5,000 YEARS =

$$\frac{7{\cdot}1^\circ \times 60 \text{ miles per degree} \times 5280 \text{ ft. per mile}}{5000 \text{ years}} =$$

$$\frac{426{\cdot} \times 5280}{5000} = 449{\cdot}856 \text{ ft., or almost exactly}$$

averages 450 feet per year.

That 450 ft. is most emphatically confirmed by the latest Astronomical Observations, as Professor Geo. Frederick Wright, on page 307 of his "Man and the Glacial Period," without any knowledge of this pyramid evidence, cautiously notes the "shifting of the Poles "observed **(450 feet per year)** "is too slight to have produced "the changes within any reasonable time, and it is not likely to "have been continuous for a long "period."

That was a most natural remark conforming to the evidence so far as then known, but now that we have the Great Pyramid's conclusive evidence that the Change of Latitude has been continuous for over 5,000 years, and the probability is that its then speed of change was even greater than now, and much greater still 10,000 to 20,000 years ago as later shown, may we not reasonably ask our Astronomers, Geologists, Mathematicians and Physicists to bring their theories into accord with this most important and definitely ascertained fact?—which so plainly demonstrates THAT WHEN THE PYRAMID WAS BUILT IT WAS IN A LATITUDE 7·1° FURTHER NORTH, OR ADDING ITS PRESENT 30° LATITUDE PROVES IT WAS THEN 37·1° NORTH LATITUDE, where the South of Spain, Sicily, GREECE and Asia Minor now range.

THEREFORE THE BUILDERS OF THE GREAT PYRAMID THEN ENJOYED A MORE VIGOROUS CLIMATE LIKE THAT OF THE PRESENT GREEKS, AND THE THEN ASSYRIANS EXPERIENCED A CLIMATE LIKE THAT OF THE PRESENT CAUCASIANS AT CORRESPONDING ALTITUDES.

Then similarly all considered as moved 7·1° from the North, the present land of the Greeks enjoyed the more vigorous climate of Austria. The Ancient Races around Rome then were vitalised by the more invigorating Climate of the present Germany, as they were then in Latitude 50° North;

whilst the pre-historic Britons who wandered in the South of England, then grew up vigorously energized by their bracing Climate then corresponding to that of the present North of Scotland, where the most vigorous and successful race now peopling the Earth and virtually dominating the British Empire, are being born to further the progressive development of the Human Race.

Although it happens that this change of Latitude is now registered as 7·1° on the Great Pyramid's Meridian, near Cairo, so that the base lines of the Pyramid's orientation only show 5′ West deviation from true North, we should bear in mind that it does not necessarily follow that this proved Recession of the North Pole has followed the direct dot and dash line I have inserted from ✚ to the North Pole on Professor Geo. Frederick Wright's "Map of the Glaciated Areas" reproduced later. I can only so far locate those two points along the 30° East Meridian, but it is probable that during that transit of the Pole from ✚ to ● its course was deflected by the Ocean Currents as suggested later, hence it may have curved round more towards Greenland at one time, or the Siberian Sea at another.

In that case, whatever deviation was made from the ✚ to ● line would have been shown by the Great Pyramid's then angular deflected orientation from the true Pole, which the French Citizen Astronomer Nouet in the year 1799 thought to be more than 5′, as I think the present deflection of the probably still more ancient Sphinx may tend to show if we are able later to accurately arrive at its age.

In that case, therefore, the Great Pyramid was a more reliable Observatory than most if not all of those we now possess with our vaunted knowledge and Science, for the Pyramid, by the angular distance of its Northern Slope from the progressive Equinoxial noon angle of the Sun, would register continuously the changing Latitude and the deviations of its East and West sides from their original base lines. North direction would register the deflections of the Polar Axis from the Great Pyramid's Meridian line originally directed to the North Pole, whereas now it seems that recent generations of Astronomers may have been unconsciously adjusting their Observatories to the universally changing Latitude, because their telescopes and other instruments have, along with their respective localities, been drifting through the changing Latitude and also deflected by the variations of the Pole to the East and West of their respective meridians, with the inevitable consequence that their local times for observations have all been correspondingly altered, so that they all respectively accord with each other and were therefore presumed to be right.

They almost appear like men chasing their shadows when travelling at the Earth-measured speed of the Sun along one parallel of Latitude and finding that their respective shadow-lengths do not vary.

That scientific men have been more than suspicious of a change in Latitude, but have hitherto been unable to satisfactorily prove it, is evidenced by the following *excerpts from Vol. XXV., page 743b of the Encyclopædia Britannica* (published in the year 1902).

"It has for more than half-a-century been "recognised as possible that the Axis of Rotation "of the Earth might not coincide with the Axis "of its figure, and in consequence that such a "rotation as this (change of Latitude) might be "going on."

Mr. S. C. Chandler "showed that there was "really a variation of the Latitude of the Points "of Observation," and of course that would plainly imply the "harmonious variation of the "Latitudes of all points of the Earth's surface" by "a minute periodic change in the point at "which the Axis of Rotation intersects the "Earth's surface," *i.e., in the positions of the Poles of the Earth.*

Perhaps readers may understand the question better after the following further quotation *from Vol. XXV., page 743, of the Encyclopædia Britannica.*

"The observations have to be made upon stars "which are crossing the Meridian; in the case "of any one star the transit occurs at all hours "of the day in succession in the course of twelve "months. For example, a star which at Mid-"Summer would be observed at 6-0 a.m., would "at Mid-Winter be observed at 6-0 p.m., when "the conditions (of atmospheric clearness for "sighting) might be materially different."

But it seems apparent that if the Earth during a given period formerly turned say 1° West, then the Greenwich and other times would also have become $\frac{24 \text{ hrs.} \times 60 \text{ mins.}}{360°} = 4$ minutes later, therefore astronomers would unconsciously allow that 4 minutes for the star to traverse the intervening space to the new location of the meridian thus removed—unless, as would be most unlikely, if not impossible, they knew of the westwardation of the Pole.

Thus the astronomical difficulty has been so very complicated by this formerly unknown series of changes and counter changes of Polar location, both in Latitude and comparative Longitude, which could not therefore be allowed for, that we cannot blame the Astronomers for not tracing this changing course of Polar location before, because not only were the Sun, Moon and Stars moving every moment past the Observatory Meridian but their Observatories were very slowly drifting into different Latitudes and possibly the comparative Celestial Meridian was also slightly diverted.

To a certain extent they have been, like the Ancient Egyptian Cults, following the peculiar and almost equally rigid teaching cultivated by their Ancestors. Their reasoning has apparently worked through certain grooves of thought which did not enable them to discern these evidences of Changing Latitude.

The CAUSE of the GLACIAL PERIOD explained by the CHANGING POLAR LOCATION, evidenced by the SUBSEQUENT DEFLECTION of the PYRAMID'S SLOPE from the SUN'S EQUINOXIAL ANGLE.

As the Latitude at Cairo gradually changed, the present 7·1° deflection of the Great Pyramid's slope from its former Equinoxial Angle (which was essentially the basis of Egyptian Astronomy) forced me to the conclusion that when the Pyramid was built the North Pole was located to the North-East of Greenland.

When in August, 1904, I received Professor G. Frederick Wright's interesting book, "Man and the Glacial Period" (the former copy sent having miscarried in New York), I was impressed by his page 130 "Map of the Glaciated Areas in North America and Europe." I marked thereon the position of the North Pole about 5,000 years ago as evidenced by the Great Pyramid's slope, and shown by the large cross ✚ I have inserted to the East upon the map here reproduced by Professor Wright's kind permission. *I have added the lines referred to on the side notes, and here place* **C** *to mark the probable Latitude of England when its Coal was formed whilst passing through the Equatorial Swamps.*

Possibly the Polar Progression was West of Spitzbergen.

The "dot-and-dash" ·—·—·—·—·, indicates the supposed course of the Pole from Behring's Straits. ——→ The Arrows show the present direction of the Gulf Stream. The "hit-and-miss" line — — — —, curving across the Atlantic from the American Glacial Boundary to its corresponding Boundary Deposits in Europe, marks the limit of the Glacial Ice-cap when the North Pole turned South of Greenland. **P** suggestively marks the probable position of the North Pole when the English Coal was deposited whilst England was about Latitude **C**, where Central Africa now grows that thick mass of Tropical marsh-grown trees, Sudd and other vegetable matter now choking the Equatorial swampy waters of the Nile and that vast territory South of Kordofan.

I had never been able to accept the theory of those who relied upon high elevations and depressions of vast areas to account for the various Geological Periods. The fact that Tertiary Strata and fossils are so abundantly found in Spitzbergen, Greenland, and other

parts of the Arctic Regions thus far examined, demonstrate that those parts of the Earth passed through long ages in the Warm Temperature Zone when their Miocene Strata were deposited with their remains of the identical plants and animals found in the corresponding Zones and Strata of Central Europe, Asia, America and Africa.

It seems impossible for the true scientific mind to conceive that the Tertiary, Coal, etc., Strata, could have been deposited within the Arctic Regions in depressions creating a tropical climate (as around the Dead Sea), if the Poles had been permanently located in their present positions.

When Professor G. F. Wright's search through Northern Asia proved the non-existence of Glacial deposits in that region corresponding to the American and European Latitudes, wherein the Glacial Ice-cap's limits are so authoritatively outlined by the "terminal moraines" which so significantly mark the boundary of the Ice-sheet along the ..... line on Professor Wright's Map, all along from Vancouver to New York and round Central Europe to Nova Zemlya, whilst Dr. Nansen's Polar Expedition proved the open sea area existing around the Pole and the unexpectedly thin crust of Ice covering the Polar tract, I was forced to the conclusion that an Open Sea Area surrounding the Pole was essential to the Earth's stability, and that the Polar location must inevitably be deflected in a varied cycling course owing to the stupendous rolling force of the Gulf Stream, and the great effect of the vast Polar under-currents of the colder Arctic Ocean, as now proved by Atlantic dredgings to be drifting silt Southwards along the floor of the Atlantic.

The change of Polar location is to my mind the only tenable basis upon which the well-established facts of Geology can be explained and as the preponderating rolling force of those Ocean Currents is aided by the stupendous weight of Glacial Ice accumulating in Greenland, Baffin's Land, etc., that tends to create a slowly deviating roll of the Earth around its core.

I was therefore brought by the conclusive evidences considered during my investigations, to believe that there is a slow tortuous motion of the Earth around its core going on beyond the daily and yearly cycles, the tracing out of which has been obscured by Astronomers attributing too much to the precession of the Equinoxes, whereas part of the apparent changes of location towards the fixed Stars is due to what I may call this "round-core-roll" of the Earth in varying cycles caused by the rolling force of the Ocean Currents variantly deflected by the land surface, as all the parts of the Earth's surface are thus directed through the constant Zones of Climate, which through the Æons of Geological Time have existed as now, with the Tropics and Arctic Circles about $23\frac{1}{4}°$ from the celestial Equator and Poles, under which all the Earth's surface variantly turns to produce renewing Changes of Climate.

Believing that, and knowing by years of Pyramid experiments the sure indication that

the North Pole was thereby located N.E. of Greenland 5,000 years ago, I took a straight strip of paper (as the reader may easily do) and placing its square corner on the North Pole of Professor Wright's map, I measured along the paper's edge the distance of the dotted Arctic Circle crossing the South of Greenland, and then moved the paper to hinge its corner on the + where my pyramid experiments led me to believe that the Pole had been located in Pyramid times; next pressing a pencil point by my left hand on the corner of the paper centered on that cross, I tried to trace the range of the Arctic Circle of 5,000 years ago, and noting it began in Siberia about the present 60th Parallel I turned the paper Westwards with the right hand, and whilst noting that such Arctic Circle track followed the 60th Parallel over Northern Europe, I observed that the Terminal Moraine boundary of the Glacial Ice appeared to range about 8° lower along 52° N. Lat. Therefore, coming down the apparent Polar track 8° to 30° E. Long., I found what seemed to be the Polar location during the European maximum Glacial Period when the Terminal Moraines were deposited along the Arctic Circle then bordering on the ..... boundary line shown across Northern Europe.

This led me to place my paper measure of the 23½° of the Arctic Circle, on the edge of what I conceived to have been its extreme limit of south-westerly range about Vancouver, during the American Glacial Period.

Then tracing the Arctic Circle Range as marked by the Glacial Terminal Moraines along the "Boundary of the North American Ice-Sheet" upon Professor Wright's Map, which he had independently outlined years before, I noticed that the Northern Shore line of the American Continent followed so closely the apparent former successive positions of the Pole as it moved from the present West to East, that I became more intent when the Southern bend was reached about the Missouri Valley, for there the Polar drift furthest Southwards through the open waters of the Hudson's Bay was so remarkable that it seems to indicate the course of the North Pole during the Glacial Period, as along the upper heavy dot-and-dash line I have added to the accompanying reproduction of Professor Wright's Map to show the probable course of the North Pole's drift.

That very strongly impressed me with the idea that there was a definite relation between the Coast line and Polar progression, and that an open Sea Area around the Pole was probably essential to the Earth's stability.

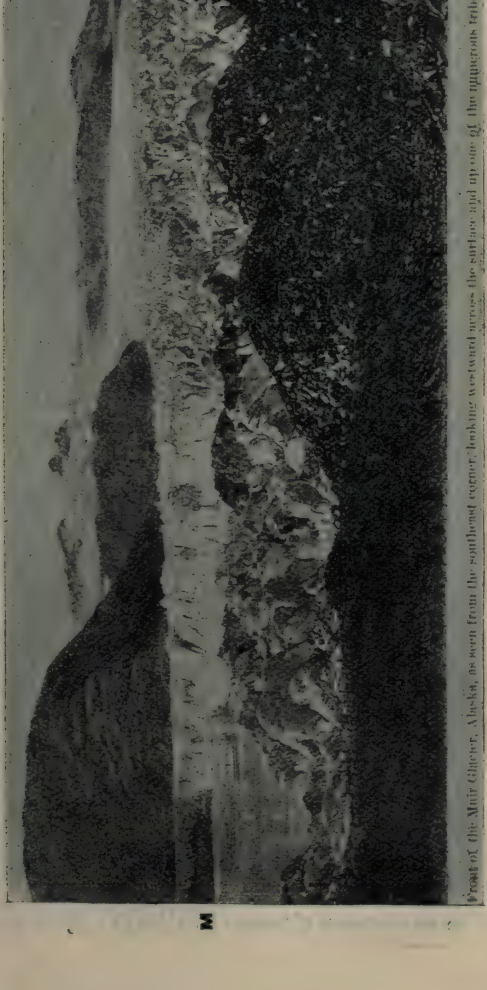
It is hardly possible to trace anything across the Glacial Area covered by the Atlantic Ocean, but assuming that an open sea area is essential around the Pole, the Drift would follow around the Greenland coast as outlined. Then the Arctic Circle's edge would sweep across the Atlantic where I have shown the lower thick "hit-and-miss" line, till it reached Europe where we correspondingly find the Terminal Moraines which there continue to mark the extreme edge of the former Arctic Circle bounding the Ice-cap during the maximum of the European Glacial Period.

TERMINAL MORAINES of ARCTIC, etc., GLACIERS.

The vast and undeniable Glacial evidences of "Terminal Moraines," which so forcibly corroborate my Pyramid proof of the change in Latitude, and demonstrate the Earth's greatest movement in the Evolution of the vital factor of Changing Climate, will be best understood by considering the corresponding glacial conditions now prevailing in Greenland and other lands fringing the Polar Ice-tracts near the Arctic and the Antarctic Circles, where like "Moraines," etc., are now being formed.

The Glacier outlets of Greenland are of such magnitude that it is hardly practicable to get an adequate illustration of their vast extent within the limits of this book.

Probably the best idea may be conveyed to readers by the following reproduction of the much smaller arm of the "Muir Glacier" in Alaska from the *Frontispiece* of Professor Geo. Frederick Wright's "Ice Age in North America," by his kind permission.



Front of the Muir Glacier, Alaska, as seen from the southeast corner, looking westward across the surface and up one of the tributaries.

This arm of the MUIR GLACIER in ALASKA shows the white Ice front 1 MILE WIDE and 400 feet high.
M M mark "Terminal Moraines" of debris piled on each side as the Ice of the receding Glacier melts.

The width of the Muir Glacier Ice-front is 1 mile, and the depth of the ice seen is 400 feet, whereas we find a width of 2½ miles, and a depth of over 1,200 feet at the front of the Jacobshavn outlet, which may be regarded as typical of the many arms of the stupendous Greenland Glacier, which is too extensive for any possible photograph.

Therefore please note that though Jacobshavn is only like a very much smaller speck than the dots marking the Arctic Circle, where on page 214 it leaves the West Coast of Greenland 2° South of Jacobshavn on the fringe of the Greenland Ice-cap, that speck geographically represents about 8 times the size of front when compared with the Muir Glacier here represented.—Hence we may safely say that the great Ice-cap Glacier covering Greenland Northwards from the Arctic Circle is many million times the size of the "Muir Glacier" front here represented, and almost too vast for our minds to grasp.

It is very important here to note that though travellers are impressed with the great force of Glaciers and their "Moraines" in Switzerland and other mountainous countries, such Mountain Glaciers are almost insignificant when compared with the stupendous erosive, etc., forces of Glaciers in the Polar Regions, as best understood by a study of that most accessible region across Greenland about the Arctic Circle, where we find the huge "Terminal Moraines" are there being deposited and left by the Glacier Ice as it recedes before the melting Sun, because that part of the Earth is tilting Southwards as the Great Pyramid's slope clearly proves, and I hope to presently establish by further evidence.

The "Terminal Moraines" on both the right and left sides of the "Muir Glacier" illustrate the piling up of stones and other debris as the Glacier Ice bears them down to where its front is melted, and as the Ice thus recedes it leaves "Terminal Moraines" like those of "Grape Creek, Colorado," here shown,

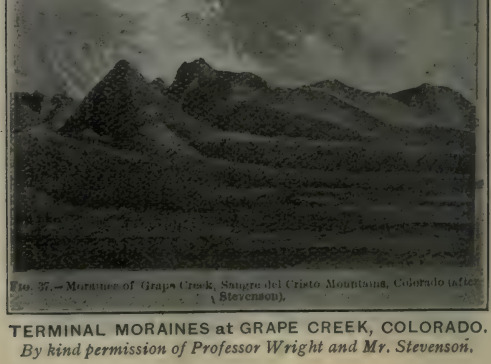


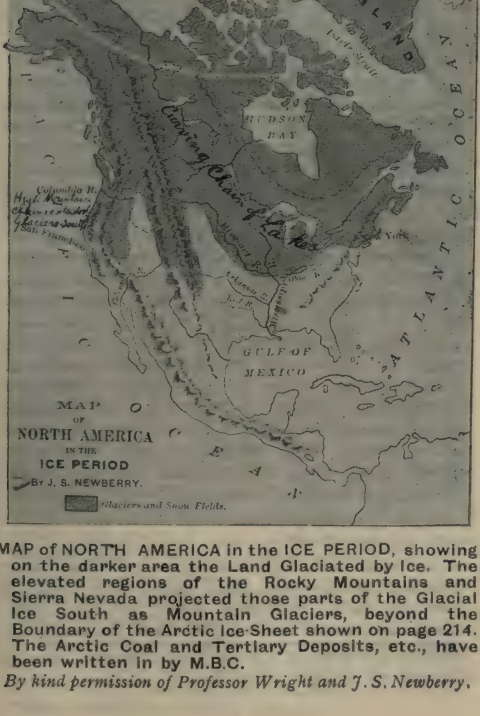
FIG. 37.—Moraines of Grape Creek, Sangre del Cristo Mountains, Colorado (after Stevenson).

TERMINAL MORAINES at GRAPE CREEK, COLORADO.
By kind permission of Professor Wright and Mr. Stevenson.

which form such incontestable evidence of Glacial action, that Geologists can thereby clearly trace the limits of the Ice-sheets which during the Glacial Period successively covered North America and Europe to the "Boundary line of the Ice-sheet" shown by ..... upon Professor Geo. Frederick Wright's Map of those Northern "Glaciated Areas."

The unmistakable fact that those "Terminal Moraines" with their Ice-scratched Boulders, Boulder Clays, etc., are found along the surface from Vancouver to New York, etc., marking that "Boundary Line" to which the Ice-sheet reached during the Glacial Period (just as the Greenland Moraines now approximate to the Arctic Circle), only appears to admit of one satisfactory explanation, *i.e.*, that those "Moraines" roughly mark the outer edge of the Arctic Circle's path during the Glacial Period whilst the North Pole was slowly drifted by the Polar Currents along the North Coast of America—as the 23½° difference of Latitude from that Coast to the "Boundary Line" so significantly indicates.

The "Moraines" now disclosed in Greenland, etc., as the Glacier Ice slowly recedes, show similar variations, reaching further South where mountains or high plateaux give colder climate, as did the Rocky Mountains and Sierra Nevada during the American Glacial Period.



MAP of NORTH AMERICA in the ICE PERIOD, showing on the darker area the Land Glaciated by Ice. The elevated regions of the Rocky Mountains and Sierra Nevada projected those parts of the Glacial Ice South as Mountain Glaciers, beyond the Boundary of the Arctic Ice-Sheet shown on page 214. The Arctic Coal and Tertiary Deposits, etc., have been written in by M.B.C.

By kind permission of Professor Wright and J. S. Newberry.

That is fairly clear from the foregoing "Map of North America in the Ice Period," whereon I have added the Arctic Circle as a white "dotted" curved line, a white dot for Jacobshavn, written "The curving Chain of Lakes," shown how the "High Mountain Chains extended their Glaciers South," and also marked Cape Lisburne, NORTH of ALASKA, where "COAL and numerous bones of the Mammoth, Bison, Horse, etc., have been found."

Bending round South-Eastwards between the "Boundary of the Ice-sheet" as defined by the "Terminal Moraines," and the corresponding moraine-like chain curving South of Hudson's Bay, we find that series of Lakes linked together by the Mackenzie River, Lake Winnipeg and the Great American Lakes, which apparently were eroded by the immense weight of the Glacial Ice which ground round in that direction with its Sub-Glacial Rivers below the Ice scouring out the debris, as we now find at Jacobshavn, etc., in Greenland as instanced later.

As the erosive powers of Glaciers increase in more than double ratio when compared with their relative weights, we thus may glean some little idea of the stupendous Glaciating force of this immense mass of Greenland Glacier Ice from the foregoing and the evidence which follows:—

I cannot by quotation do justice to Professor G. Frederick Wright's masterly exposition of the stupendous effects of Glacial Ice as witnessed by his experience in Alaska, Greenland, etc., and recorded in his "Ice-Age in North America," which should be wholly read to be fully appreciated. I can only extract the following dealing with Greenland, because it is by far the most important accessible field for studying Glacial phenomena:—Ex page 67:—

"It is now pretty evident that the whole of "Greenland, except a narrow border about the "Southern end, is covered by one continuous "sheet of moving ice pressing outward on every "side toward the open water of the surrounding "seas." Then, recording Baron Nordenskiold's 1883 Expedition, he relates: "Ascending "the ice-sheet from Disco Bay, in Latitude 69° "he proceeded eastward for eighteen days across "a continuous ice-field. Rivers were flowing in "channels upon the surface like those cut on "land in horizontal strata of shale or sandstone, "only that the pure deep blue of the ice-walls "were, by comparison, infinitely more beautiful. "These rivers were not, however, perfectly "continuous. After flowing for a distance "in channels on the surface, they, one and "all, plunged with deafening roar into some "yawning crevasse, to find their way to the sea "through sub-glacial channels" (between the Glacial Ice and the Land Surface it was scouring seawards).

On page 69 he continues:—"The vast "roaring water-mass had bored for itself a "vertical hole, probably down to the rock, "certainly more than 2,000 feet beneath, on "which the glacier rested"—or pressed whilst eroding its way to the sea.

Although Dr. Nansen, in 1888, was only able to cross 260 miles of the Glacier in Greenland at about one-fourth of its length, "He there discovered that about Latitude 64° "the inland ice of Greenland has the shape of "a shield rising rather rapidly, but regularly, "from the East coast to 9,000 feet, flat and "even in the middle, and falling again regularly "towards the Western side."—*Encyclopædia Britannica, Vol. XXXI., page* 807a.

Page 78 shows that this stupendous Glacier Ice shield rises to a thickness described as "CONSIDERABLY IN EXCESS OF 10,000 FEET."

Page 70. The investigations of Dr. Rink have proved that the Greenland Glacier Ice travels about 40 feet per day throughout the year irrespective of the Seasons. The Jacobshavn Arm alone discharges 432,000,000 cubic feet of Ice per day into the Sea, or 4,092,000,000 tons per year.

In addition to the tremendous erosion of the moving Ice, we should estimate the great power of the Sub-Glacial Stream under such a Glacier Arm on the West Coast of Greenland which is estimated to deposit 15,000 to 20,000 tons of sediment per day (page 74), or about 7,000,000 tons per year, and as there are hundreds of such Glacier Terminals and Streams, the magnitude of their deposits of boulders, clay, etc., is almost beyond conception, and far exceeds the force necessary to deposit such thick beds of Boulder Clay, etc., so conspicuously seen around the Sea Coast at Flamborough, Filey, etc., in Yorkshire (England), and traced within the ..... "Boundary of the Glacial Ice-Sheet," mapped on page 214, by Professors Wright, Kendall and other eminent Geologists.

On page 71 of Professor G. F. Wright's "Ice-Age in North America" we read—

"The recent explorations, as already mentioned, have proved that what now we designate "as coast-land free from ice was formerly covered "with ice like the interior. This ancient ice-"covering reached, in the immediate vicinity of "the present inland ice, a height of 3,000 to 4,000 "feet, and, farther seaward, 2,000 to 3,000 feet "above the sea. All the usual traces of ancient ice-"action, the erratic blocks and the ground rocks, "are the same here as in Northern Europe."

Page 75—"Great as the mass of ice is which "still envelops Greenland, there were times when "the land was even more completely covered "up by it; indeed, there is good reason to suppose "that there was a time when every atom of "the country was covered and that life was "hardly possible for man. . . . . With "the exception of places where the rocks are "easy of disintegration, and the traces of glacial "action have been to a great extent destroyed, "the whole country bears the marks of the "grinding and polishing of ice; and judging "by the flatness of the curves of the *roches "moutonnées*, and by the perfection of the polish "which still remains upon the rocks, after they "have sustained many centuries of extreme varia-"tions of temperature, the Glacial period during "which such effects were produced must have "vastly exceeded in duration or severity the Glacial "period of Europe; and the existing great interior "ice-plateau of Greenland, enormous as it is, must "be considered as but the remnant of a mass "which was incalculably greater."

PROFESSOR GEO. FREDERICK WRIGHT'S SEARCH THROUGH NORTH ASIA FOR GLACIAL EVIDENCES.

During the autumn of 1900 I had been privileged to travel through Syria and that most instructive geological area in the world around the Dead Sea, in the company of Professor Wright, of Oberlin University, U.S.A., who is justly regarded as one of the greatest living authorities on Glacial Geology, his books on the "Ice Age in America," "Asiatic Russia," etc., being recognised by scientists in Europe and America as standard works. At the request of eminent American scientists he and his son had undertaken an expedition through China, Manchuria, Siberia, Turkestan, etc., to ascertain whether any traces of Glacial action could be found, as Geologists generally expected that when the Polar Ice laid the Glacial Deposits which are so abundantly found in Northern Europe and North America, a corresponding area of Northern Asia would then have been covered by the Polar Ice Cap.

As a keen Geologist, Professor Wright went out fully expecting that clear Glacial evidences would be found, but after nearly two years' careful search, failed to find any trace of Glacial Stones, even though close examination was made of those numerous and extensive Railway Excavations along the great Trans-Siberian Railway which was then mostly newly constructed, and several excavations were still in progress.

No better opportunity for such an enquiry could have been chosen in the World's history, and no abler investigator could have been obtained, yet no trace whatever of Glacial action could be found, despite the fact that he as a most experienced Geologist tried every coign of vantage.

Indeed, the first Glacial Stones which Professor G. F. Wright saw after his two years' search were those fine specimens still *in situ* in Brickyards behind our house, where he pointed out the fact that Severus Hills, etc., within York, were formed by Glacial Moraines, and he truly said that the splendid Glacial Deposits of Boulder Clay, etc., on the Yorkshire Coast, exposed by erosion of the Sea, virtually started the Science of Geology, especially the Glacial Section.

Professor Wright's investigations thus proved that there *had not been an Ice Age in Siberia during our Glacial period*, and therefore the expectation that the Arctic Circle had then extended on the Asiatic side to nearly the 40th parallel of Latitude was disproved, whilst on the contrary the evidences indicated that in former ages the Siberian climate had been warmer and was now getting colder.

The mammoths, etc., discovered during recent years embedded in the Ice near the mouths of Siberian Rivers, indicate that those and other large animals belonging to warmer climates perished through clinging to their old forest haunts, as the Earth's gradual Polar change turned that part of the World towards the colder Polar Area, whilst they were shut off from migration Southwards by the impassable mountains of Thibet and the

Himalayas, which prevented counter migration to keep them within a suitable climate.

Although bountiful nature came to the mammoths' aid by providing protective hair, the changing Latitude eventually bore the herds of mammoths and other animals from warmer climates to extinction by starvation in the Siberian Winter Ice drifted towards the mouths of the great Siberian rivers.

The turning of the Earth appears to be further evidenced by those extensive ruins of Ancient American civilization, now in the midst of the Arizona Desert, as Pueblos at Cases Grandes, etc., where the Rock Temples, Houses, etc., are surrounded by the debris, in which are abundantly found husks of Indian corn, woven sandals, rope and implements. Some of these, kindly given me by Dr. Baum of the "Records of the Past Exploration Fund," Washington, U.S.A., have been presented to the Yorkshire Philosophical Society's Museum at York, whilst numerous others are in the U.S.A. Museums at Washington, New York, etc.

Examination of these inevitably lead us to the conclusion that those people then lived in a fertile country, round which Indian Corn (maize), etc., flourished. We cannot believe that when the Vast Area of U.S.A. was covered by Prairie and Forest, the small Ancient Races of 2,000 or more years ago would have chosen the Desert for their home when water and other prime essentials for existence were absent.—No! The only reasonable explanation is, that they like all early people chose their home where food, water, etc., were best obtainable, along the Rivers then flowing through the Canyons of a then fertile Arizona.

Then evidently that part of the World was in the well-watered corn-growing area then in Latitude a few degrees further North, from which the Southward turning of that part of the Earth has brought these Rock dwellings, etc., into the waterless Desert Zone.

The corresponding Northward turn on the Pacific side of the World seems steadily raising Australia into the Desert Zone, which Northern Australia has already entered.

The continuation of that vast Earth-turning movement appears further evidenced by the rapid development of Japanese energy, as, according to my theory, they are above all people most directly upon the most speedy part of this great cycle; therefore as they are emerging from the warmer to the more bracing Northern climate, their Race most rapidly becomes invigorated and tends to spread Northwards. I estimate that when the Pyramids were built 5/6,000 years ago Japanese territory was more in the Latitude of Formosa or the lower Islands, when the then Japanese would, through the more oppressive climate, be correspondingly indolent and lacking in energy.

On the other hand, as Siberia gradually drifts towards the Arctic Zone its people must press Southwards, therefore vital conflict is inevitable between the Russians and Japanese.

I believe that the great wars of future centuries will be for the bracing and energizing territories as they drift through the cool Temperate Zone, where wealth and comfort can best be developed in what we call "white men's lands."

The Israelites, after their Exodus from Egypt, increased in power when they entered the then more bracing climate of Palestine, most of which is raised 2,000 feet above the sea, but when they were dispersed to lower countries their vigour decreased. Possibly Moses had that great vitalizing object in view.

The continuation of the Earth's turning movement is again evidenced in Palestine, which appears drifting *through lower Latitudes* into the Sinai Desert Zone, as I think thoughtful observers will admit when they notice the thousands of vine terraces, etc., evidencing the former moister climate, which we know within the historic period enabled that then fertile country to support a far more numerous population than Zionism can ever restore.

These lead me to believe that when the Egyptians, Greeks, Romans, etc., were powerful they enjoyed a more invigorating Northern climate similar to that of the present Mid-Europe, the change from which has been so slow as to be almost imperceptible.

We cannot expect to verify this exceedingly slow World-turning-movement in the Polar Regions nor present fertile Zones until more precise Astronomical Records are made through many years, but on the fringe of the World's Desert Zones the proofs of this greatest cycle of the World's movement may be traced where history over 1,000 years aids us.

Turning to HISTORIC EVIDENCE, Classic Scholars have often been puzzled with those repeated references made by Herodotus, Josephus, and others, to the severe winters experienced in Syria by the Assyrians, Babylonians and Egyptians during ancient wars, when severe frosts and snow paralysed military operations where warm climatic conditions now prevail—indeed Professor Wright's party and myself rode through the depth of winter (Dec. 14th to 26th, 1900,) over the whole district which the ancient armies habitually crossed between Damascus and Jerusalem, and only found snow near the snow-cap about 8,000 feet up Mount Hermon—all the rest of the way we experienced warmer weather than the usual English Summer.

The Ancient armies did not need to cross Mount Hermon, as they naturally preferred the lower ways South or North of Hermon, where the open country admitted of easier transport and their forces were much less liable to sudden attacks.

Again, students of Roman History have been perplexed by similar references to the severe winters experienced by the Romans, who, according to the writings of Pliny and earlier Historians, seem to have purposely

chosen the Winter Season for their campaigns against the warlike people North of the Danube, because the long period during which the Danube was then frozen over enabled their armies to cross that then bridgeless river upon the ice. It now rarely freezes over, and then only during short periods.

Even the memorable winter of 1812 (less than 100 years ago), when Napoleon's army retreating from Moscow experienced such terrible cold, seems to have exceeded the severity of subsequent winters, whilst we repeatedly hear the remark of old people that the severe winters of their youth do not recur, and that the summers are becoming warmer.

We find that the Droughts in Australia are gradually becoming worse, as that country seems to be slowly passing into that Arid Zone, which the Northern part of Australia is now passing through.

We know that the great races of Assyria, Phœnicia, Greece, Rome and the Byzantine Empire existed where we now find the feebler races of Turks, Greeks, Italians and Spaniards appear to be waning. The explanation of that, I think, is less in the races themselves, than in the fact that this turning of the World is bringing Southern Europe, etc., towards the arid, enervating Sahara Zone, as evidenced by the increasing Sand drifts blown across the Mediterranean into Spain, Malta and even Southern Italy.

Thus it appears that the races of Southern Europe—Greeks, Romans, Italians, Spaniards, Turks, etc.—have been losing vitality through their countries gradually drifting more towards the arid Desert region now occupied by the Southern Mediterranean and Sahara.

I had striking evidence of that in Southern Italy when travelling through from Egypt early in January, 1901, and was surprised to notice how the wealthier Italians were clothed in large overcoats and furs, whilst I did not need to put on even a light overcoat. After several unsuccessful attempts to ascertain the cause, I fortunately journeyed from Rome to Turin with one of the largest Continental Woollen Manufacturers, who explained that he "sold his heaviest woollens in the low-lands "of Southern Italy, where the blood of the "people is so thinned by the warm climate." I had suggested that the large thick coats seemed more suitable for the Swiss, but he replied that the bracing atmosphere of Switzerland kept the Swiss so healthy and strong that they did not need the heavy woollens.

We have similar experience by Indian officials, who have to move the Government into the Mountains at Simla during the Summer.

We are only just beginning to realise the supreme importance of Climate. The vigour of North Americans as also of Scotchmen is mainly due to their bracing Northern climate and similarly the Swiss, German and Norwegian races grow in vigour aided by their bracing climate. That is why the best

physicians advise us to spend holidays in Switzerland, Scotland, Norway, etc., whilst the jaded American is advised to go to Nova Scotia, the Rocky Mountains, etc. Similarly the invigorating Scotch air matures Scotchmen to become such potent forces in British life.

I think that as our American cousins in U.S.A. during future centuries become weakened by this Southward turning, the hardier Canadian generations will tend to predominate in physical and intellectual vigour.

This cause has already operated in America where the great Mexican Races and Aztecs have deteriorated as their countries have gradually become warmer and more enervating through their territories slowly turning nearer to the Equator, as the North Pole was gradually progressing from Greenland Seas (where it seems to have been located during our Glacial period) to its present position, from which it may sometime move towards Behring Straits and then possibly down the Pacific Ocean, until each country in turn passes in varying sequence through those Climatic Zones of Frigid, Temperate and Tropical temperatures through which Geological evidences prove that they have passed in Geological times, *e.g.*, when our Coal Seams were formed, this part of the World must have been under the Tropics as the Sigillaria and other Tree roots and stems in Coal Seams prove; whilst again when our "Old Red Sandstone" rocks were formed the sand which formed them was rounded by being wind-driven in the arid climate which prevails where the Arabian, Sahara, etc., Deserts now are, as evidenced by microscopic tests which show those polished round grains characteristic of wind-worn sand, which is so distinct from the oval-worn sand of sea and river action.

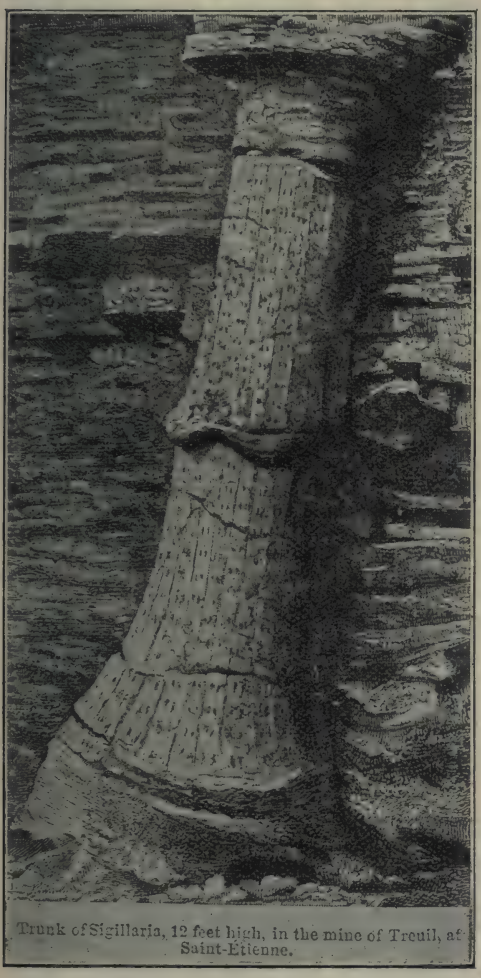
No doubt the varying depths of the present Coal Seams establish the fact of varied elevations and depressions, but examination of the fossil trees and plants of which coal consists, demonstrates that the Carboniferous climate must have been Tropical and of great humidity—probably marshy jungle—exactly the opposite to what we find in the Dead Sea Depression, where the Torrid climate in that Depression inflicts sterility by the intense evaporation of waters which cannot flow upwards to the sea.

It is important to remember that depressions in the Cold Temperate and Arctic Regions could only be filled with Water, Ice or Glacial Debris, which could not possibly produce Coal.

Therefore I submit that we cannot reasonably believe that the British and North American coalfields (much less those yet unworked further North in Alaska, etc.) could have derived the necessary coal-forming Tropical climate by depression to any depth in their present latitudes.

It seems against all evidence and reason to believe that depressions could there develop the absolutely essential Tropical climate needed to grow the luxuriant 70 feet high

Sigillaria Trees, etc., found in coal deposits, though we can rightly believe that they could be grown well above sea level in vast Equatorial jungle swamps like those of Central Africa through which the Nile meanders, laying growths of similar fallen trees, sud-banks of matted intergrown vegetation, etc., such as we can reasonably imagine may during slow depressions have laid those splendid beds of coal now found in South Wales and England—whilst Britain, America, etc., were passing through the Tropical Zone.



Trunk of Sigillaria, 12 feet high, in the mine of Treuil, at Saint-Étienne.

12 ft. of a SIGILLARIA TRUNK in the COAL SEAM of TREUIL, at ST. ETIENNE, in N.E. FRANCE.

By Messrs. Mackenzie's kind permission, from the *National Encyclopædia, Vol. XII.*

I believe that the raw materials for future Coal-beds are now being laid in the vast Sudan Swamp Tracts traversed by the Tropical Nile waters, under almost identical conditions as those formerly prevailing during the so-called Carboniferous Period when the American, British, French, German, etc.,

Coal Seams were laid, as the reader may understand by the following excerpt from the *Encyclopædia Britannica*, vol. xxxiii., page 39–b :—

"SUDD is the name given to the vegetable "obstruction which has at various dates closed "the upper waters of the Nile to Navigation. "It seems to have stopped the Roman centurions "whom Nero sent to explore the Nile."

Sir Samuel Baker, in 1870, thus describes the growing accumulation :—

"The immense number of floating islands "(of vegetable matter) that were constantly "passing down the stream of the White Nile "had no exit ; thus they were sucked under "the original obstruction by the force of the "stream, which passed through some mysterious "channel, until the subterranean passage became "choked with a wondrous accumulation of "vegetable matter. The entire river became "a marsh, through which, by the great pressure "of water, the stream oozed through innumerable "small channels. In fact, the White Nile had "disappeared."

Page 39–d—

"The pressure of the Sudd on vessels enclosed "within it has been compared, both by Sir "Samuel Baker and Sir William Garstin, to "what Arctic travellers relate of 'the motion "of the ice-floes when the pack is breaking up.' "It is mainly caused by large masses of papyrus "and *omm sûf* reeds, which are loosened by "storms, and drift down until they lodge on "some obstruction and form a dam across the "channel, rapidly converted by fresh arrivals "into a block which may be as much as 25 miles "in length. In time the whole river is blotted "out as Baker found it.

"The closing of the upper waters of the Nile "not only hampered communication with "Central Africa ; it was also believed to diminish "the supply of fertilising water on which the "whole life of Egypt depended. The unprecedented failure of the Nile flood in 1899-1900 "drew general attention to the sudd, which "was thought by some to be responsible for it, "and in the former year £ (E) 10,000 were "placed at the disposal of the Governor-General "of the Sudan for the purpose of re-opening "the White Nile, by removing the great mass "of weed which blocked the Bahr al-Jebel, "almost from Lake No to Shambeh. The work "was begun under the direction of Sir William "Garstin, in December, 1899. 'The primary "object of this measure,' he wrote, 'is to open "the Bahr al-Jebel to navigation, and to permit "an examination of the river and the surrounding "swamps.'

"Instead of the Sudd being, as had been supposed, a tangle of weed floating on the water "and descending a few feet below the surface, "it proved in most cases to be a mass of decayed "vegetation, papyrus roots and earth, much "resembling peat in its consistency, and compressed into such solidity by the force of the "current, that men could walk over it everywhere and even elephants could in places "cross it without danger."

It seems to me that as successive layers of "Sudd," Trees, etc., are added, the superincumbent weight compresses the successive

layers into the peat-like strata found in the bottom layers of these accumulations, until they become brown coal or lignite such as are found in Ireland, Germany, the United States, etc., when such territories drift into drier and cooler climates; but when the Changing Latitude has deflected other territories, like South Wales, through such vast hot Desert Zones as that of Sahara, where the accumulating weight of Sand-drifts is super-posed under the powerful heat and effective metamorphic conditions of that arid region where the heat accumulates and descends through the strata of the sand, as unmistakably impressed me when in the "Serapeum," at Ancient Memphis, the surface heat from the sand layers increased far more as we descended feet, than the interior heat increases down great depths in Coal mines I have descended.

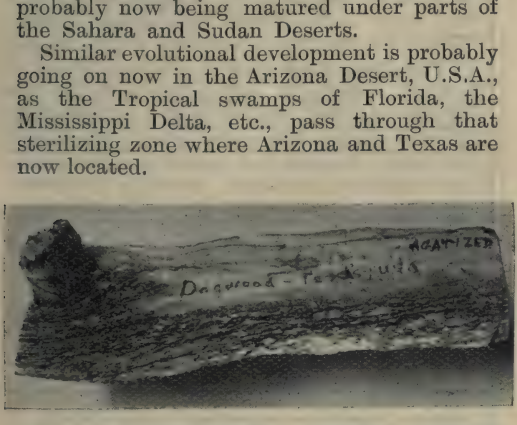
Travellers visiting the "Serapeum" in the Desert West of Cairo will remember the Turkish-bath-like heat they experienced whilst inspecting those marvellous sarcophagi of the sacred "Bulls of Apis."

Through the head accumulating beneath the Torrid Deserts we may expect to find that vegetable matter which might otherwise have been left as brown coal nearer the surface, becomes metamorphosed into black coal and anthracite.

I have seen on the Deserts the "Petrified Forests" of Trees turned into stone, showing the grain of the timber joints of the petrified tree branches, etc., as below.

I therefore think that it is very probable that as the Equatorial swamps of the Sudan are by this turning of the Earth deflected through the Sahara Zone, the swamp-deposited accumulations of vegetable matter forming coal are there transformed into coal, which is probably now being matured under parts of the Sahara and Sudan Deserts.

Similar evolutional development is probably going on now in the Arizona Desert, U.S.A., as the Tropical swamps of Florida, the Mississippi Delta, etc., pass through that sterilizing zone where Arizona and Texas are now located.



Piece of AGATIZED *CORNUS SERICEA* or SWAMP DOGWOOD picked up from quantities of others in the TEXAS part of the GREAT AMERICAN DESERT.

Persons who have seen the original piece now in my possession, and thoughtful readers seeing this illustration, cannot doubt the fact that it was originally part of a Dogwood tree, which has by exposure to the Arid Desert

conditions been turned into that hard Agate stone, as certified by the Chief of the U.S.A. Department of Forests, at Washington, who kindly gave it me there.

It appears evident that when Dogwood was grown there, probably over 1,000 years ago, the climate was moist and distinctly different from the Desert conditions now experienced there—hence that to my mind constitutes further evidence of the Latitude having changed in accordance with my theory of Polar Progression as manifest from the slope of the Great Pyramid.

To Geologically substantiate my theory of the progression of the Polar Axis and consequent Changing Latitude as the chief factor in the evolution of the Earth's crust during Geological Periods, requires impartial and conclusive evidence that whereas the Glacial Periods of Northern America and Europe occurred in the latest Geological Period, similar Glacial Deposits were interlaid in the Strata during much earlier Geological Periods in other parts of the World; and also that the Pre-Glacial Strata in North America and Europe evidence changes of Climate as they passed from Tropical to colder Zones, whilst the Antipodes opposite those parts of the Earth correspondingly passed from colder to warmer climates as the Latitude changed.

Those proofs are gradually forthcoming with increasing force through Geological investigation proceeding in other parts of the World, as the following excerpts from the *Encyclopædia Britannica, Vol. XXXI., page 422-a* (by the kind permission of the Editor), distinctly prove. There, reading of the Coal-forming "Glossopteris Flora," we find recorded:—

"The plant-beds of the Permo-Carboniferous "Age in South Africa, South America, India and "Australia demonstrate the existence of a widely "established vegetation which agrees in age with "the Upper Carboniferous and Permian vegeta-"tion of the north (*i.e.*, Northern Hemisphere).

"The Glossopteris flora of Australia occurs in "certain regions in association with deposits "which are now recognised as true boulder-beds, "formed during wide-spread glacial conditions. "In India the same flora occurs in a thick series "of freshwater sediments, known as the Lower "Gondwana system, including basal boulder-beds "like those of Australia. Similar glacial deposits "occur also in South America.

"In South Africa, *Glossopteris, Gangamopteris* "and other genera, identical with those from "Australia and India, are abundantly represented, "and here again, as in India and South America, "the plants are found in association with exten-"sive deposits of undoubted glacial origin. To "state the case in a few words, there is in South "Africa, South America, Australia and India, "an extensive series of sediments containing "*Glossopteris, Gangamopteris* and other genera, "and including beds full of ice-scratched boulders."

These to my mind prove that formerly, as now in Polar Regions, a continuous Glacial Period occurred, traversing various parts of

the Earth, in some cases before, and in others ages after, the Coal was laid in lands which are now Tropical or in the South Temperate Zone, just as we may reasonably conclude that the progression of the Polar Axis varied their Latitudes and Climates.

That varying Change of Climate is almost everywhere evidenced through the Geological Strata, of which that most accessible to cultured travellers in Switzerland may be taken as typical and proved by its fossil remains of vegetable life, as per *Encyclopædia Britannica, Vol. XXXI., page 437-b*, which significantly begins:—

"The Miocene Period is unrepresented by any "deposits in Great Britain," which I submit was probably deflected outside that Zone of vegetation through which Switzerland passed, as the patient investigations of Mr. Oswald Heer through the Oeningen Strata along Lake Constance, in ascending order establish "the "marked decrease in the number of palms and "Tropical plants, and the replacement of these "latter by present Mediterranean or North "American forms."—"One species of rice and "four of millet"—also "one of Ginger," etc., occur.

So we might go on quoting from the results of like researches elsewhere, particularly in America and Greenland by Mr Heer, where in Grinnell Land, 81° North Latitude, he found Tertiary Flora in the Strata, anent which we read on page 438-c that he found fossil "Conifers, Poplars, Birches, Elms, Limes," etc.

"Such an assemblage at the present day would "suggest a latitude quite 25° further South."

Similarly "at 78° in Spitzbergen, Mr. Heer "records 136 species of fossil plants."

"Among the fossil plants found at Disco "(Greenland), latitude 70°, more than a quarter "are also found in the Miocene of Central "Europe." These are "principally composed "of Planes and Sequoia" (American "Big Trees" now found at 30° lower latitude).

"If these different deposits are contemporaneous, as is not improbable, there is a distinct "change in the flora as we move farther from the "Pole, which suggests that difference of latitude, "then as now, was accompanied by a difference "in the flora. But if this process is continuous "from latitude to latitude, then we ought not to "look for a flora of equivalent age in the warm "temperate Miocene deposits of central Europe, "but should rather expect to find that the "temperate plants of Greenland were contemporaneous with a tropical flora in Central Europe. As "Mr. Starkie Gardner has pointed out, it does not "seem reasonable to assume that the same flora "could have ranged then through 40° of latitude."

We further on read, "A steady decrease of "temperature marked the Pliocene period "throughout Europe, and gradually brought "the climatic conditions into correspondence "with those now existing, till towards the end of "the period neither climate nor physical geography differed greatly from those now existing."

What I consider to be the misleading reference on page 422-b, stating "it is probable "that during the earlier part of the Carboniferous "period the vegetation of the World was uniform "in character," was likely to be held until this Changing Latitude could now be established.

UNIFORM CONTEMPORARY GEOLOGY UNTENABLE.

If uniform Geological Periods had been contemporary all over the world as early Geologists inferred and so misled stereotyped teachers to teach, all parts of the world would have shown continuous Strata. England and other countries would not have missed the Miocene and other Periods, whilst Coal, etc., would have been evenly found throughout the World, whereas we find it absent from large territories and generally located in wide basin-like areas, such as those now being formed by the Nile, Congo, Amazon, Mississippi, etc., Rivers.

The COAL found within the Arctic Circle at Cape Lisburn in N.W. Alaska, and elsewhere (per U.S.A. Map, opposite page 32 of "The Ice Age in North America"), must inevitably have been laid whilst Alaska slowly passed through the Tropical Zone by that CHANGE of POLAR LOCATION and LATITUDE, which I submit provides the only reasonable explanation of the geological, physical and historic facts now being disclosed around the World.

On such evidence I cannot believe that great Glacial Periods ever were produced by high elevations of land, which merely develop isolated Glaciers of local effect, such as we find in the Rocky Mountains, Alps, Himalayas, Thibet, etc. To produce the tremendous effects of the Glacial Period, essentially required that Change of Climate and full force of Arctic conditions such as we only find plainly indicated within the Polar Circles, and best exemplified by the stupendous Ice-cap which Dr. Nansen, Professor Wright, and others have proved beyond doubt to be now thrusting its terrific avalanche of ice over Greenland.

To enable the reader to gain further ideas of the overwhelming effects of Glacial Ice drifts under Arctic conditions, and the vast accumulations of boulders, grit, clay, etc., which were as now deposited about the fringe of the Arctic Circle, I append the following excerpts from Professor Geo. Frederick Wright's "Man and the Glacial Period" (price 5/-, published by D. Appleton & Co., New York), which I strongly recommend as the best and most readable book on the subject for readers who desire to know more of Glacial Conditions.

I will endeavour to supply copies for orders received, until it can be obtained through London, etc., booksellers.

The Glacial Deposits near the top of Mount Washington, U.S.A., per page 91, prove "that "the Ice AROUND THERE WAS MORE "THAN A MILE IN DEPTH," and similar proofs are abundantly clear in Europe.

At the foot of his page 106 we read :—"The "glacial ice deposits to the South are now more "deeply coloured than those to the North, "showing that they have been longer exposed to "oxidising agencies."

On page 112 Professor Wright states "the "advance to the Southward must have been "slow," as I argue it must inevitably have been as the Pole meandered through the North American Archipelago in a South-Easterly direction. He further records "the final "retreat of the ice-front occupied but a short "time relatively to the whole of the period which "has since elapsed."

I suggest that the inroads of the warm Gulf Stream then turning North brought about that speedy retreat.

Almost everywhere along the line of Terminal Moraines across North America and Europe, indicated by ..... upon the map on page 214, the evidence, per Professor Wright's page 90, is clear "that when the "glacial ice began to retreat, the retreat was so "continuous and rapid that no parallel terminal "moraines were formed for many miles."

Finally, after Professor G. Frederick Wright had carefully measured the Geological Time by studying the rate of erosion at Niagara, etc., he writes on *page 313* of his "*Man and the Glacial Period*"—

"It is certainly not more than 10,000 to "15,000 years ago that the ice finally melted off "from the Laurentian Highlands" (between the Gulf of St. Lawrence and Hudson's Bay).

Professor Percy F. Kendall, of the Yorkshire University, Leeds, contributed a valuable section to Professor Wright's work, from which, by kind permission, I quote :—Page 141—

THE PRE-GLACIAL CLIMATE.

"In all speculations regarding the cause "of the Glacial epoch, due account must be "taken of the undoubted fact that it came on "with extreme slowness and departed with "comparative suddenness. In the East of "England an almost perfect and uninterrupted "sequence of deposits is preserved, extending from "the early part of the Pliocene period down to the "present day. These in descending order are :—

"1.—Post-glacial sands, gravels, etc.
"2.—Glacial series.
"3.—The 'Forest Bed' and associated marine deposits.
"4.—Chillesford clay and sand.
"5.—The many successive stages of the Red Crag.
"6.—The Coralline Crag.

"The fossils preserved in these deposits, apart "from the physical indications, exhibit the "climatal changes which accompanied their "deposition. The Coralline Crag contains a "fauna consisting mainly of species which now "range to the Mediterranean, many of them "being restricted to the warm Southern waters.

"The Red Crag consists of an irregular "assemblage of beaches and sand-banks of "widely different ages, but their sequence can "be made out with ease by a study of the fauna.

"In the oldest deposits, Mediterranean species "are very numerous, while the boreal forms are

"comparatively rare; but in successive later "deposits the proportions are very gradually "reversed, and from the overlying Chillesford "series the Mediterranean species are practically "absent.

"In the Forest Bed series there is a marine "band—the *Leda myalis* bed—which contains "an almost Arctic assemblage of shells; while "at about the same horizon plant-remains "have been found, including such high northern "species as *Salix polaris* and *Betula nana*. (Bones of the elephant, etc., were found in the Forest Bed.)

"The glacial deposits do not, in my opinion, "contain anywhere in England or Wales a "genuine intrinsic fauna, such shells as occur "in the East Anglian glacial deposits, having "been derived in part from a contemporary "sea-bed, and, for the rest, from the older "formations, down perhaps to the Coralline Crag. "In the post-glacial deposits we have hardly "any trace of a survival of the boreal forms, and "I consider that the whole marine fauna of the "North Sea was entirely obliterated at the cul-"mination of the Glacial epoch, and that the re-"peopling in post-glacial times proceeded mainly "from the English Channel into which the "northern forms never penetrated."

In demolishing the Depression Hypothesis that Eastern England was submerged during the Glacial Period, Professor Kendall, referring to apparent isolated marine shells found in some Glacial Drifts, on page 175 concludes **"The only reasonable conclusion is that "these evidences of marine action never "existed, because the land in Glacial times "was never depressed below its present "level."**

Space does not admit of my further quoting Professor Kendall's well-reasoned description of the British Glacial evidences and his most valuable investigations, so patiently, quietly and thoroughly conducted. Fortunately they are appropriately enshrined in the "Transactions of the Geological Society" for yet greater use.

So far the study of **Polar Progression** leads me to believe that when the British coal strata were laid, the North Pole was located near Behring's Straits, where the **P** is shown to the left of the Map on page 214. Then the climate of England was that of the great Tropical swamps with their luxuriant growths through which the Nile now flows, as the reader may readily see by measuring from **P** to the North Pole, and extending a parallel distance from England across the African part of the Tropic of Cancer (shown by the dotted line) to about Kordofan, represented by **C** above the map.

The thick dot and dash line along the Polar Sea North of America and then curving round Greenland, outlines what I conceive to have been the course traversed since then by the North Pole to its present location, as evidenced by Glacial Moraines and confirmed by Geological Strata.

Coal is found at varying depths in Northern Europe, North America, China, South Africa, New Zealand, etc., at vast distances from the Tropical Zone in which alone coal-forming conditions still prevail as formerly.

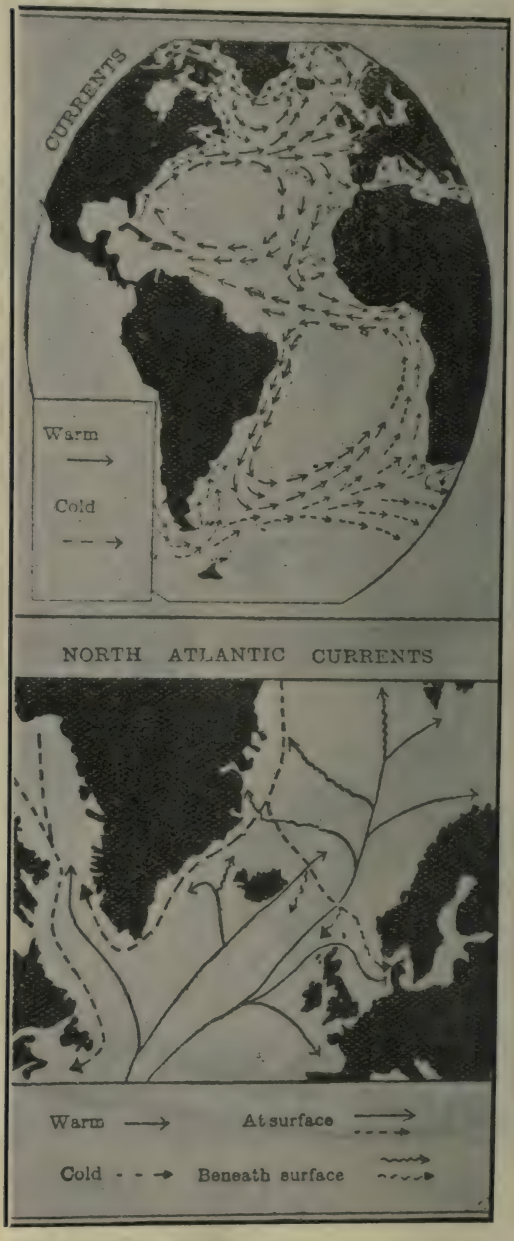
The following Diagrams, *reproduced by kind permission of the publishers of the Encyclopædia Britannica*, may aid the reader towards more easily locating the Latitudes of Chalk, Limestone, etc., Deposits :—

DIAGRAMS showing the DEPTHS and DEPOSITS of the ATLANTIC OCEAN.

Note on the Upper (Depths) Diagram that serpent-like tract raised 1/2,000 feet down the Mid-Atlantic, apparently marking under-beds

which possibly may have been formed by Polar Deposits when the Pole in the Æons of Geological Time traversed the length of the Atlantic Ocean.

As the effects of the Ocean Currents constitute an important factor in locating the Areas of Ocean Deposits of "Ooze," etc., these further Diagrams of the Atlantic Currents are also added through the courtesy of the Publishers of the *Encyclopædia Britannica*.



DIAGRAMS showing the CURRENTS of the ATLANTIC OCEAN.

Geologists are convinced by fossil remains that the Chalks, Limestones, etc., of Northern Europe and America were formed in warm oceans near the Tropics, where similar deposits are now being made in the Atlantic and Pacific Oceans.

Through widespread Geological investigations, the successive layers of rocks nearly all over the World disclose these and other recurring formations, which must have been formed whilst those respective parts of the World passed by varying cycles very slowly through the Tropical and Sub-Tropical Zones from which most are now so far removed.

Probably when the British Devonian or Old Red Sandstone was laid the North Pole was drifting through the North Pacific Aleutian Archipelago when England would likely be about the Desert Zone now traversed by Arabia.

As the Pole meandered round through the Behring Sea, England would then be very slowly turned through Tropical Swamps, like the Bahr-al-Jebel of the Nile Basin, where the British Coal Measures may have been laid; then as the Polar location rounded Alaska through Behring Straits England would be deflected upwards through the Sahara Desert Zone where the New Red Sandstone or Trias rock formations were probably laid.

Next as the Pole progressed towards Prince Albert Land, England would be tilted up to where the Mediterranean now is, when the Shales and Limestones of the Jurassic Lias were probably laid; then as the Pole turned round through Hudson's Bay, England would apparently by this roll of the earth be tilted into the warm Atlantic area where the Mid-Atlantic now is. There the British Oolitic and Coralline Strata of the Jurassic Period seem to have been laid in that warmer climate.

As the Polar progression rounded Labrador England would pass through the great Chalk-forming Zone, where the British Chalk Beds of the Cretaceous Period were probably laid, as we know the Atlantic is still depositing vast beds of Chalk Ooze in those latitudes between Spain and the United States.

I do not mean that necessarily the whole of the British strata between the Old Red Sandstone and the present surface Boulder Clay, etc., were laid during one direct transit of the Pole from the Behring Sea round Greenland to the present Polar location, nor yet that the contours of the continents have always remained exactly as now, BUT MY POINT IS, THAT BROADLY, WHAT HAVE BEEN HITHERTO GEOLOGICALLY REGARDED AS PERIODS OF CLIMATIC CONDITIONS SIMULTANEOUSLY AFFECTING THE WHOLE EARTH, WERE MUCH MORE EASILY AND NATURALLY DEVELOPED BY THE SIMPLE AGENCY OF "CHANGING LATITUDE," which I thus trace by Polar Progression through typical strata to illustrate that principle to the reader.

There probably were many variations in the successive meandering courses of Polar Progression as the Pole was from time to time deflected coastwise by changes of land-levels near the oceans, erosions and diversions of ocean currents; *e.g.*, when

the land formerly connecting Britain and Scandinavia gradually sank, admitting the sea now covering it, there would be a diversion of part of the Gulf Stream up the English Channel, thus tending to divert the course of Polar Progression, which would be further developed when the Tidal flow gained full force across the present North Sea area.

Scientists, who best know the power of those Physical Forces of Gravitation and Balance which govern the Earth's stability, argued that the immense mass of Ice which during the Glacial Period covered the North of Europe, North portion of the Atlantic and North America—say from St. Petersburg, round by London and via New York, to the North-West Territory—would be of such stupendous weight as would inevitably have caused that part of the Earth to balance over towards the Mid-Atlantic Equator unless a counter-balance-weight of Glacial Ice co-existed across Northern Asia—say across Siberia, or an equivalent thickness of land and ice existed around the South Pole.

The more explorers learn of the South Polar Area, the less grows their idea of the land area within the Antarctic Circle, and it is found that the 30 to 50 ft. thickness of Polar Pack-ice encrusting the Antarctic Seas is relatively insignificant to the stupendous weight of the 6,000 to 7,000 ft. thickness of the immense Glaciers which almost cover Greenland and other Arctic Land Areas North of America, where the thickness seems to yearly increase over the Northern portion, so accentuating the turning movement.

Professor Wright's investigations through the corresponding Latitudes of North Asia having proved that Surface Glacial Deposits DO NOT there exist, it seems fairly evident that the Polar Ice during the latest Glacial period did not cover Northern Asia as was supposed, therefore we have the strongest possible reason to believe that the Polar Ice during the European and American Glacial period was broadly restricted to the $23\frac{1}{2}°$ limit of the Arctic Circle round the North Pole as now. That, together with the direct evidence of 7° to 8° change distinctly evidenced by the Great Pyramid Slope, brought me to the conclusion that the Pole of the Earth has been and is gradually shifting in varying cycles, but before I dare put that remarkable proposition forward, more definite proofs were needed.

Naturally I first thought of the great effect of the Polar Sea Currents drifting the huge ice-packs from Behring's Straits towards Greenland, and thence bearing Icebergs, as Dr. Nansen's last Expedition to the North Pole Area clearly proved by the helpless drifting of the Ice-packed "Fram" across the Polar Sea on the Ice-floes, which he found were generally limited to about 30 ft. thickness, whereas scientists had previously expected, from the 2/10,000 feet thickness of Greenland Ice, that the ice around the Pole would be thicker still, and therefore of most stupendous weight.

EXCERPT FROM NANSEN'S "FARTHEST NORTH."

Dr. NANSEN, in his "FARTHEST NORTH," says "that the Polar Drift-ice is "continually moving from one side of the Polar "basin North of Behring Strait and the Coast "of Siberia, and across the regions around "the Pole, and out towards the Atlantic Ocean. "Where Geographers at one time were disposed "to locate a solid, immovable and massive ice-"mantle, covering the Northern extremity of "our globe, we now find a continually breaking "and shifting expanse of drift-ice." Further, on page 634, he states :—"From the numerous "observations I made, I established the "existence of a slow current under the ice, "travelling in the same direction." Again, he adds, on page 636, "A new drift like the "Fram's would be invaluable. I hope that a "further expedition may be taken ere long, "and if it goes through Behring Strait and "thence northwards I shall be much surprised "if observations are not taken which will "prove of far greater scope and importance "than those made by us."

Next my Geological training in the County of Yorkshire (where the stupendous effect of Glacial Action and Deposits are probably more evident than anywhere else in the World) led me to consider the overwhelming effect which the weight of the Arctic Current Ice-drifts and Glacial Deposits along the coasts of North Canada, Hudson's Bay, Labrador, Newfoundland, etc., must be exercising upon the World's turning and thus its Zones of Climate, which appear to be very gradually changing in their respective temperatures, etc., over the fixed land surface as the Latitude changes through the Polar Drift.

Round our home vast numbers of Glacial Stones may be found, some of which weigh 10 or even more than 20 tons, and bear unmistakable striations (scratch marks) made by Glacial Ice. They may be seen *in situ* where they were deposited by the melting Glaciers and Icebergs, just as we know similar deposits are now being dropped by the Glacial Ice along the Arctic Circle across Greenland, and by melting Icebergs and Ice-drifts on the Bank of Newfoundland and that far vaster area across the North Atlantic where Icebergs drift to the danger of Navigation, where, therefore, ships seldom go. The varied kinds of Granites, Greenstones, etc., found in the Glacial Deposits of both Northern Europe and America, evidence the fact that they like the Ice-borne Deposits of Newfoundland and Glacial Drifts of Greenland have been transported over long distances.—Some similar huge blocks nearly the size of a house, now found in Germany and proved to have been stranded during the Glacial period, can be unmistakably identified as having been transported from Norway, from whence also came part of the North-Eastern England Glacial Drift.

I would particularly draw attention to the fact that whereas the Polar Ice-cap laid its Southward fringe of Glacial Deposits in North-West Europe, from say Moscow in 55° N. Latitude to Latitudes decreasing Westward by Berlin 53° to London 51°, it appears to have extended still further South to 39° at Washington in the United States, and seems to turn North by Dakota, etc., therefore taking that as the limit of the progressive Arctic Circle (always about 23½° from the Pole) we may fairly trace back the then location of the North Pole as veering round Greenland.

The Pyramid evidences found in Egypt brought me to the conclusion that there had been a change of about 7·1° in the Latitude of the Pyramids during the last 5,000 years (assuming that to be about their age), as the Great Pyramid's slope is now deflected about 7·1° from the Equinoxial Elevation of the Sun, whereas when the Pyramid was regularly used as an Observatory, it was essential that its great slope should thus mark the plane of the Celestial Equator.

As the speed of the Changing Latitude only appeared to be about $\frac{1}{10}$th of that of the "Precession of the Equinoxes," and Geological facts indicated that the cycle of change was spiral and of varying speed, further evidence was sought during a visit to America and by consideration of the Polar facts disclosed by Dr. Nansen's Polar Expedition, when it may be remembered that contrary to the general expectation the Ice around the Pole was only found to be about 20 to 30 feet thick, whereas the Greenland Ice-fields had been found to be about 3,000 feet thick, and in the interior very much thicker, therefore the ice around the Pole was expected to be thicker still.

The drifting of Nansen's ship, "Fram," across the Polar Area on the Asiatic side proved not only that the ice there was relatively thin, covering a vast open Sea, but Dr. Nansen's observations indicated that the Drift Ice Area more immediately around the Pole was also floating on a great Sea, as the force of the prevailing winds deflected the course of the Icebound "Fram."

That most important fact discovered by Dr. Nansen of immense Sea Areas covered by relatively thin Ice around the Pole, does not appear to have received that consideration which it deserves from Glacial Geologists; especially in view of the corresponding fact made evident by Professor Wright's search through Siberia, where Surface Glacial Deposits of Geological age cannot be found.

Consideration of these and other evidences such as the direction and erosive power of Arctic Currents, the enormous weight of Glacial Ice on the North American Archipelago, Baffin's Land, Greenland, etc., lead me to think that the very excessive weight of Ice upon the greatly preponderating Land Areas West of Greenland, aided by the Arctic Currents, is tending to slowly turn the Earth so that Europe and North America are gradually approaching towards the Equatorial

Zone as the location of the Pole changes, thus causing slow changing of Latitude.

Evidences so far go to prove the absolute necessity of a Sea Area around the Pole to maintain the stability of the Earth by providing for the melting of the Glacial and Drift Ice on the outer fringe of the Arctic Circle which, in former periods as still now approximately, bounds the limits of the Glacial tracts.

Thus the stability of the weighty Ice-cap appears to be sustained by the gradual Polar movement which ensures the melting of the Ice-fringe at about 23½° from the Pole.

We have no adequate reason for believing that the range of the Arctic Circle has extended beyond 23½° from the moving Pole, on the contrary evidence is accumulating to show that during the known Glacial Periods those parts of the World were then within the Arctic Circle and that the Pole has progressed along a tortuous cycle of varying speed as proved by the Glacial Moraines which roughly indicate on the map (page 214) the former boundaries of the Arctic Circles.

I have added the ▬ • ▬ • line 23½° further North from Glacial data, to mark the Polar course of that Great Earth-forming and turning Cycle which now seems to be moving at a much slower speed, and therefore is almost imperceptible, now that the Polar currents (largely deflected by the far-reaching influence of the Gulf Stream) appear to be almost land-locked by the extensive Land Areas of the North American Archipelago and Greenland.

But when the Glacial Period prevailed over North America to near Washington, the Pole would be drifting down the Sea West of Greenland, as we may prove by centering the Pole from the 23½° Circle of Latitude outlined by the fringe of the United States Glacial Deposits so ably traced out by Professor Wright and others. The then existing Ice Age would cover most of the North Atlantic and deflect the powerful Gulf Stream towards the Mediterranean, and later as the Polar progression rounded the South of Greenland the Gulf Stream would be deflected still further down the West Coast of Africa towards the Gulf of Guinea, which then was possibly largely eroded by the thus diverted Gulf Stream.

The Polar Course then seems to have progressed up the East Greenland Sea towards Iceland when the Glacial Period prevailed in England. Later it appears to have rounded North of Iceland when the Secondary British Glacier appeared, as shown by Professor Kendall's valuable investigations into Yorkshire Glacial Geology. It has been named the Scandinavian Glacier—on account of its having drifted Scandinavian Boulders and Stones to England.

From there the Pole seems to have drifted more rapidly to near its present position as the Gulf Stream's warm waters thawed its course and thus developed increasing velocity and effective force.

The investigation of Egyptian Pyramid Astronomy leads me to the conclusion that it was this accelerated speed of Polar progression which, unknown to the Pyramid Astronomers, led to their successive pyramids becoming obsolete when the thus changing Latitude deflected the original pyramid slopes from the essential Equinoxial Angle of the Sun's noon Elevation which, of course, progressed with the Polar change.

Fortunately by the present deflection of 7·1° in the Great Pyramid's Slope from the present Equinoxial Angle, we have a fixed gauge of the speed and direction of this great world-wide change which is so vitally, though slowly, affecting the conditions of human life.

As this appears to accord with the strong evidences of Glacial Geology and link the Glacial Period with the Historic, I submit that the service of scientific truth might now be furthered by joint enquiries in this direction being made by the Astronomical, Geological and Physical Sections of the British, American and Continental Associations, with a view to inducing Astronomers to consider other movements beyond precession tending to the change of Latitude, and bringing their theories more into accord with the recently proved facts of Glacial Geology, —especially now that we appear to be able to indicate the Polar locations during the American and European Glacial Period as well as at the time the Great Pyramid was built, and compare them with Glacial conditions within the present Arctic Circle.

Though the evidence thus far may not be considered conclusive, there is a strong probability that during the European Glacial Period, when the Areas around the North Sea were being glaciated, the forceful flow of the voluminous drainage from above and below that vast Glacial tract must have formed great rivers directed towards the English Channel Area down which a wide estuary would likely be formed, as the contour of Northern Europe and England inclines its rivers to converge and drain in that direction.

Assuming that to be the case, we should naturally expect that as the Polar Ice receded Northwards before the growing force of the Gulf Stream which gradually pressed Northward along the West coasts of Africa, Spain and France to force its way up where the English Channel now is, it would find easy entry through the sedimentary deposits of the Estuary, then through the Channel Area, and as the North Sea Area gradually subsided, the combined Gulf Stream and Tidal flow up the English Channel would ultimately drift those sedimentary deposits into the North Sea Area, forming those immense Sand Banks such as "The Dogger Banks," etc., which are spread over the shallow area of the North Sea.

During my voyage across the North Atlantic in the Autumn of 1903, conversation with the ship's officers elicited the fact (well known to cable companies and navigators passing

Newfoundland) that the old telegraph cable, laid over the Sand Banks which are there being formed by debris dropped from the melting Icebergs, has long been thereby covered up to such a depth that it cannot now be found. Examination of the Boulder Clays in Northern Europe and America indicate that much of their surface soil and material was deposited in this way and by direct Glaciers.

Where the Glaciers fall into the sea as the Greenland Glaciers do to such an enormous extent, the boulders, sand, grit, etc., finally dropped by the sea-melted ice, form the Banks of debris such as we find over the vast area around Newfoundland, where the sand and grit brought up by the soap fixed under the sounding-leads used by passing steamers may be regarded as having been deposited by Glacial drift.

When visiting the United States where so much Ice is used, I was amused at the experience of a dollar-hunting American, who thought his fortune was assured when he found the coast terminus of one of Greenland's great glaciers (of which there are many), where its ice breaks off icebergs at the almost incredible rate of 4,092,000,000 tons per annum, or about 11,200,000 tons per day during the Summer season when ice is most wanted in New York, etc., where it is then sold in quantities almost as great as coal—indeed, the coal merchants often combine the bulky ice business with their trade.

[The height of the Jacobshavn Ice-front from which the Icebergs are "calved" into the Atlantic, is about five times the height of York Minster, or four times the height of the spire of St. Paul's, London; St. Peter's, Rome; or "The Capitol" at Washington.]

He thought that the Glacier Ice thus ready broken and tumbled into the sea for loading into his steamer would prove a mine of wealth; but when the first cargo arrived for sale his customers found such a quantity of fine grit and sand in the ice that only part of it could be sold, and that at low prices for outside refrigerators, etc., because it was altogether unsuitable for the pure ice required so largely for cooling drinks. Therefore he lost money on the cargo and his visions of wealth from Glacial Ice melted away, as likewise did those of the Scandinavian who bore the like disappointment when he similarly tried to utilize the Glacier Ice from the great and only European Glacier which falls into the sea within the Arctic Circle, near Cape North.

Anyone who melts down Glacier Ice—even in a kettle for water—will be surprised to find the quantity of sand and grit which the ice collects in grinding over the rocks and ground on its way down the valleys.

Here it may be well to point out the effect of this transportation by which probably millions of tons of Ice-borne material are annually brought from the Polar Area and deposited in that zone between 43° and 58° North Atlantic Latitude, where reference to a Globe of the Earth will suggest to reasoning minds that the enormous weight of such deposits must

tend to tilt the whole Earth, so that the region between Canada and Scandinavia appears turning southwards; because not only is the vast accumulating weight bearing the Earth over in that direction, but there is also a corresponding lessening of weight going on in the Polar Latitudes from which that immense bulk of material is being brought in successive years. When to this is added the erosive effect of the constant southerly currents, which also bear the stupendous weight of Ice-floes and icebergs in the same direction, we may reasonably believe that these combined with other causes suffice to bring about that gradual change in the location of the Polar Axis, which, I believe, has resulted in the progress of the North Pole from the Greenland Seas to its present position on its indirect cycle towards the Behring Sea.

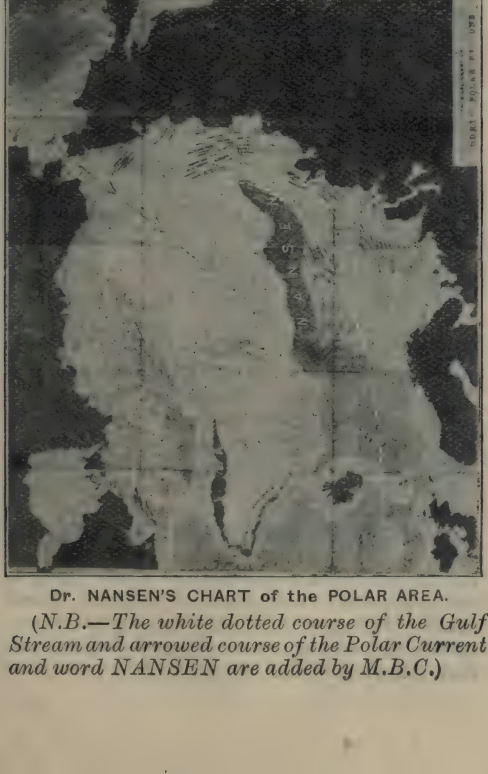
The upper double track shows the shorter course traversed on the "Out and Home" voyage between July 1st and December 31st; whilst the lower track shows the course taken 5° or 300 miles further South to avoid the Icebergs' drift South-East of Newfoundland between January 1st and June 30th.

CHART of the STANDARD STEAMSHIP ROUTES across the NORTH ATLANTIC, showing the SOUTHERN DIVERSION of the Tracks to avoid the huge ICEBERGS drifting from the NORTH.

From the evidences I have been able to consider, there seems reason to believe that North-Eastern Asia is progressing towards the Polar Area faster than North-Eastern

Europe, and therefore faster than Syria and Egypt whose corresponding change of Latitude would more accord with the latter.—Yet N.E. Asia would more truly gauge the Time occupied by the Earth's great turning cycle if the Polar course through the Oceans had followed any meridian circle, but Geological evidence proves that the Geological cycles were varied and more in accord with what we may reasonably deduce from the irregular Ocean basins and Polar deflections which would result from the deviations caused by land obstructions and diversions caused by the great Ocean Currents such as the Gulf Stream, etc.

We do not know how far the Polar course of this Earth-turning movement may be varied by the prevailing Polar winds and the great difference in the retarding force of the Tides in their vast tidal sweep across the North-East Atlantic—as compared with the feebler force on the smaller land-blocked sea round Behring Strait—but some idea may be gained by comparing the latter with the corresponding Atlantic wide sea expanse from Iceland to Nova Zemlya on the accompanying reproduction of Dr. Nansen's "Physical Chart of the North Polar Regions," where the serrated Western coasts of the British Isles, Norway, etc., evidence the force of that erosion combined with that of the Gulf Stream, which weakens in force as it is deflected around the Polar Area (as indicated by the white dotted line) *until it disappears under the Polar Ice, forming that warmer under-current which Dr. Nansen found.*—That probably gives impetus to the Southbound Arctic Current which flows down the East Coast of Greenland.



Dr. NANSEN'S CHART of the POLAR AREA.

(*N.B.—The white dotted course of the Gulf Stream and arrowed course of the Polar Current and word NANSEN are added by M.B.C.*)

Few persons realise the great force which the Earth's Rotation has in directing the erosion of sea currents, but a voyage up the coast of Syria, where the waves of the almost tideless Mediterranean are persistently rolled towards Palestine by the Earth's Rotation, will be impressed with that fact by the uncomfortable side-rolling of the Ship as the waves pass her *side-ways*.

That rotative effect similarly accounts for the general fact that on voyages between Europe and the United States ships cross the Atlantic waves as they roll towards Europe. That not only erodes the coast of Europe, but has considerable effect upon the Arctic areas, as the warm Gulf Stream carried partly by rotation in the N.E. direction keeps open the European side of the Polar Area. Thus the warm Gulf Stream and rotative force unitedly dominate the circulation of the Arctic Ocean, as may be seen by Nansen's Chart when examined on a larger scale.

Then we may also notice the important fact that the Polar Area is at present land-locked on the Greenland and North American side to an extent we have not hitherto realised.

Polar Explorations via Greenland, Baffin's land, etc., prove that very extensive land-areas exist within the Arctic Quadrant West of the Iceland Meridian, whilst equally important is the fact that hardly any surface land exists in the opposite Quadrant North of Siberia, which Nansen has conclusively proved has a surface of Arctic Sea.

We may follow the Gulf Stream's course N.E. of Norway till it is again deflected N.E. by the N.E. direction of Nova Zemlya, beyond which it is diverted still more N.E. by the currents of the inflowing waters of the Great Siberian Rivers, beyond which it is finally turned further N.E. by the Pacific current coming in through the Behring Straits, till it becomes very extensively land-locked by the great North American Arctic land areas known as Prince Patrick's Land, Melville's Land, Baffin's Land, etc. These divert the current still more N.E. by Grant's Land, North of Greenland towards the Pole, as indicated by the spiral curve shown by the white "hit and miss" line I have inserted upon the reproduction of Nansen's Chart.

When we reflect that throughout this spiral course the Earth's rotative force impels the current in that spiral direction, and that as Nansen has proved the prevailing winds tend in the same direction during the latter half of its course, we may better understand the effective World-turning power of those combined forces which, though at present retarded by being land-locked North-West of Greenland, will presumably again worm a way increasingly out by the open sea at Behring's Straits or along the East of Greenland until sufficient ice accumulates to divert the Gulf Stream's entry into the Polar Area, when these World-turning forces will have full sway at greater speed, and as the Arctic Ice would probably drift towards the British Isles, a new

"Ice-age" might be brought about by the Polar Cycle in the Æons of Time to come.

Even now in the Latitude of Labrador, corresponding to the British Isles, the Polar Ice currents inflict an almost Arctic Climate on that province.

How far the Polar progression would meander round Iceland, Norway, or pass down the Atlantic would depend upon the extent to which those turning forces developed in power, and how far they were counteracted by contingent deflections made by diversions of other Oceanic Currents, etc., in both the Northern and Southern Hemisphere, including the Antarctic, of which we know so little.

In the Æons of Time it may be that the Pole during one of these great Polar Cycles may happen to be in the North Atlantic when co-operating forces at the Antarctic cause the North Pole to cycle round by the Siberian Coast till the adventitious help of other currents, etc., drift the Pole through Behring's Straits, or even Baffin's Sound, but before the definite course of these Cycles can be determined much investigation into Polar Navigation, Astronomy and Geology will be needed with centuries of observation records.

The evidences of such movement make it difficult to believe that the Polar location could ever have been stationary, and it seems almost impossible to conceive that the stability of the Earth could be maintained if the Pole were permanently located on land, where the countervailing forces of Ocean currents could not work to relieve the Polar accumulations of Ice and Snow which recent explorations of Greenland, etc., have proved to extend to such vast steadily increasing thickness that if the Pole were located on land the result would almost certainly be that the immense accumulations of Ice and Snow would overweight the Earth, which is not poised vertically, but at an angle of about $23\frac{1}{2}°$.

As space does not admit of further following this argument here, I can only conclude by expressing my idea that during the past Geological Periods the Polar Forces of erosive Sea Currents, Ice-drifts, Iceberg Deposits, the enormously accumulating weight of Glacial Ice in Greenland, Baffin's Land, etc., and the Northerly erosion of the great Siberian Rivers (on the opposite side of the North Pole) unitedly working in the same direction, have consistently tended to turn down the North Atlantic Polar Latitudes in the direction of the present Atlantic Equator, and that probably the course of the North Pole has traversed the whole length of the Atlantic, and will in the course of time yet to come pass through the North Pacific southwards; thus, as in the past, ever providing for that successive rest and renewal of the whole surface of the Earth during millions of years, just as we see in the very much smaller annual cycle of the Seasons, when Nature rests each year through Winter and is renewed by vegetable life, etc., in Spring.

Probably the Atlantic and Pacific Ocean beds have been largely scoured out by Polar currents and ice-erosions, as they were irregularly traversed by the North and South Poles alternately, whilst unitedly conforming to the great work of shaping and renewing the Earth's surface.

Thus each part of the Earth's surface would varyingly be brought under Polar, Temperate and Tropical Climates. In the Tropics the Coal Measures would be laid as they are now being formed in the Equatorial Swamps drained by the Nile, Deltas of the Mississippi, Amazon, Niger, Ganges, etc. Periods of rest would follow as the various parts of the World passed through the present Desert Zones of Sahara, Sinai, Arabia, Turkestan, Thibet, Arizona, etc., where the round Sandstone Rocks have probably being formed; whilst the Chalks, Limestones, etc., were formed under Tropical and Sub-Tropical Ocean Areas during different periods of the Earth's great variently renewing cycle.

It would almost seem impossible for us to form an approximate idea of the time occupied in that renewing cycle, because, owing to the Ocean Currents and varying land contours, the Polar tracks through the irregular Oceanic Areas would take a varying course thus deflected from the meridian or more direct cycle which the 7° to 8° Pyramid difference would have enabled us to measure into the 360° of the circle. Yet it seems to me as though the approximate scale for measuring that period is recorded by the 8° difference between the former Equinoxial Slope of the Sun as registered by the Great Pyramid, and the Sun's present Equinoxial Elevation at Cairo, which fortunately is about mid-way between the Mid-Atlantic and corresponding Pacific Meridian, where the speed of the turning movement seems to be greatest.

To me it seems a significant fact that the reputed cradles of the human race in Assyria and Egypt in the Old World, as well as those of Arizona and Mexico in the New World, are all located near the hub of this great Earth-turning movement, therefore they would experience these climatic changes far more slowly than the countries bordering on the Atlantic and Pacific Coasts—hence near those hub-like areas we find the oldest permanent records of men.

That 8° being 1/45th part of the 360° in the Celestial Circle, the approximate length of that renewing cycle seems to be not less than 225,000 years if we assume the age of the Great Pyramid to be about 5,000 years, as 5,000 years × 45 = 225,000 years, but the tortuous course of Polar progression indicates a very much longer period.

As my long series of experiments convinced me that the Equinoxial Slope formed the quintessence of Pyramid observation, I feel satisfied that the Egyptians must have built their final Pyramid to that slope, and as the photographic proofs on page 78A register the fact that its shortest shadow now falls on the

2nd or 3rd of March when the Sun is 7·1° short of its Equinoxial Elevation, that, to my thinking, indicates a distinct decrease of 7·1° in the Latitude of Egypt during the last 5,000 years, and therefore a like reduction of 7·1° in the Latitude of Syria and Southern Europe, which would largely account for the decay in vitality of the Greeks, Romans, etc., when we remember the enervating effect which the warmer Temperate Zone has upon races drifting South, as instanced by the lassitude which affects white settlers in Texas, Mexico and the Southern U.S.A., as well as British people who settle in Italy, Turkey and the countries within 45° of Latitude.

We have definite evidences such as those alluded to in the change of climate in Australia, Arizona, Palestine, etc., within the Historic Period—whilst, finally, we have what appears to me to be the most definite evidence distinctly indicated in both measure of Time and speed of Angular Change in Latitude by the present deflection of the Great Pyramid's Slope from the Equinoxial Angle to which it must of necessity have been built by the Ancient Egyptians, who were above all else observers or worshippers of the Sun, and most needed that central plane of Astronomical Observation to denote the Celestial Equator as the central path of the Sun's annual course.

The science of Astronomy must ultimately be brought into accord with these and other well-established Geological and Historical facts.

No fact in the History of the World's surface is so well authenticated as that of the Soil of Northern Europe and North America having been laid during the latest Geological Period when the Northern Ice-cap covered those Regions, just as we find like deposits are being made over the Newfoundland Banks and North Atlantic to the North Polar Area, where Nansen found that the most extensive beds of Clay and Mud were being formed.—On the other hand, Professor Wright's investigations through Northern Asia have established the fact that no corresponding Ice-cap extended Southwards in that direction.

There seems to be only one natural explanation to these undeniable facts of Geology and History, and that is the gradual turning of the Earth through the action of Polar Ice, Ocean Currents, etc., as before indicated and possibly facilitated by the Earth's outer crust slipping round its dense molten core.

As this is only a side-issue raised by my Pyramid experiments when searching for the origin of our Almanacs, I cannot here devote more space to the subject.

So many complicated causes appear to affect the problem of Polar Progression that it will take many years to fully outline its past course. Beyond those great forces of Gravitation, etc., already computed by Astronomers, the additional factors to be studied appear to be:—

(1) Polar Currents, Ice-drifts and Winds;

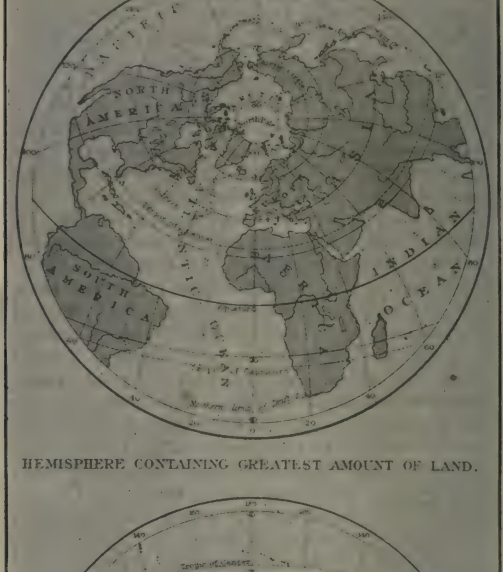
(2) The forces of the Arctic Currents, Gulf Stream and Siberian River Currents in the Arctic Area;

(3) The relative countervailing forces in the Antarctic Regions;

(4) The immense accumulations of Glacial Ice in Iceland, Greenland, Baffin's Land, etc.;

(5) The vast Iceberg and Pack Ice deposits annually spread over the Newfoundland Banks and North Atlantic, all tending in the same direction, must, in the absence of equally effective counterpoise at the South Pole, be gradually turning the whole Earth so that the North Atlantic appears progressing towards the Celestial Equator, as my Pyramid observations indicated and led me to conclude that the Latitude had changed;

(6) The vast preponderance of Land in the Northern Hemisphere as outlined below which may partly cause the 23½° Slope of the Earth's Axis :—



HEMISPHERE CONTAINING GREATEST AMOUNT OF LAND.

HEMISPHERE CONTAINING GREATEST AMOUNT OF WATER.

From the "Times Atlas," London, by kind permission of the Publishers.

At present the progress through the North-West Greenland Land-locked area is almost imperceptible, and has probably been very slow during recent centuries; but thousands of years ago I think it would be much more rapid when the Pole was in the open Sea nearer to Greenland, as the Great Pyramid's then Equinoxial Slope definitely indicates, therefore we can reasonably understand how the Egyptian Pyramid builders through ages found their Pyramid Slopes then became defective, and later generations believing like we, that they had truer astronomical knowledge than their ancestors, would try to build truer Pyramids as National Observatories *when they did not know that the changing Latitude was altering the Sun's Equinoxial Altitude in that locality, and thus steadily making their fixed Pyramid Slopes imperfect and out of date.*

Thus I believe that the greatest work of men in building the Great Pyramid for the great and worthy purpose of making a "daily observation of things" (more especially Times and Seasons for Agricultural purposes)—as signified by the Egyptian word *almenichiaka* —which according to Eusebius originated our word Almanack), first elucidated for men's great gain the wonderful cycle of the Year in Seasons, and finally has, by its imperishable record of this change in the Sun's declination at Equatorial noon through past ages, revealed to us this greatest cycle of the Earth's turning movement which explains the world's wonderful providential progression through those climatic changes, which aided the formation of our Surface-soils, Coal-beds, Sandstone, Clay, etc., which now enhance the comfort of men and so largely control the greatest affairs of the World, by vitally affecting the energies and destinies of all men and thus of all nations.

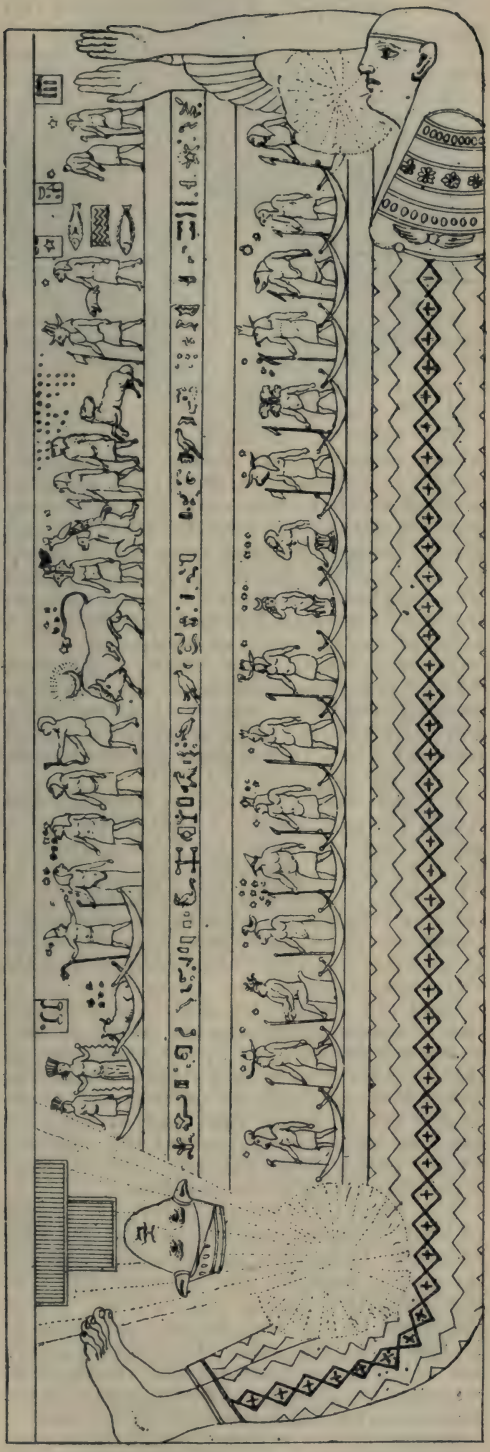
From Ancient History and Monuments, which teem with evidences of the supreme importance attached by Ancient Peoples to tracing out and recording their Almanac Periods, we know that they toiled through thousands of years to develop our Calendar.

Those numerous Almanac Records of the past would fill scores of books to detail; indeed, hundreds of books have been written about them, but so far as I can learn no work extant deals with the "Evolution of the Calendar" by that natural inevitable means of developing Time and Observations of the Sun by studying Shadows, as disclosed by my Pyramid Observations.

It must, therefore suffice to reproduce some of the more telling evidences from Egypt and Mexico, where the study of the Sun's Annual Movements were best elucidated by the Pyramid system of Astronomy.

The illustrations shown upon the two following pages graphically convey the Almanac ideas which have come down to us through the Ages of Time from the Ancient Egyptians.

The EGYPTIAN ZODIAC or ALMANAC



in the TEMPLE of DENDERAH, in EGYPT

The EGYPTIAN ZODIAC or ALMANAC in the TEMPLE at DENDERAH (reproduced from the Rev. W. Hewson's Atlas).

The hieroglyphic sketches on the last two pages reproduce the Zodiac in the Temple at Denderah, which is typical of others at Esneh and its neighbour Ed Dayr. Some writers only date these back to the Ptolemaic Period (about 300 B.C.), but Wm. Ebers, Vol. II., page 230, well says that "Although some Greek "ideas have been incorporated with the "conception they disclose of the attributes "of the Goddess (Hathor), every portion of "the fundamental notions on which it rests "had its roots in Egyptian soil," as readers who have seen the Zodiacal sign in the "Tombs of the Kings," near Thebes, dating back to about 1300 B.C., and the Almanac inscriptions in Karnack and other Ancient Egyptian Temples, will admit to be most probable. Egyptian ideas pervade every detail.

The practical colonizing Roman Policy, whilst protecting all within the Empire, sought to cultivate the best ideas of those over whom they ruled. By that spirit they probably got the Egyptian Priesthood to thus portray the best Egyptian knowledge, whereas the much earlier conquering Shepherd Kings who apparently terminated Pyramid observations could not gain Pyramid knowledge by a policy of extermination or threatening.

Those Zodiacal Signs, which begin with "Leo" the "Constellation of the Lion," as pictured, will be understood by Astronomers, and as they are not of great interest to casual readers I will not detail them, but simply refer to some special points.

It is remarkable that both at Denderah and Esneh the sign for the Tropic of Cancer is represented not by a crab but by a Scarabæus—that Egyptian Egg-laying Beetle, as the "Emblem of Life" issuing from the loins of the female to the left; whilst the corresponding Tropic of Capric(*h*)ornus is shown by the two-horned youth issuing from the male Egyptian to the right.

Both are represented with a surrounding halo of sun-rays, typifying the yearly journey of the Sun from Cancer upwards to union at the Equator Zenith, and thence descending down the right side to Capricornus, above which the 19 boats with starred positions seem to depict the 19 years of the "Metonic Cycle" by which the Sun and Moon (Year and Month) countings were co-ordinated.

The Sun as the Daily and Yearly vivifier of both vegetable and animal life was thus naturally illustrated as travelling through its Annual track by this Almanac Zodiac in the Denderah Temple of "Hathor"—that "Goddess of Joy and Love"—as according to Ebers II., page 229, "Hathor" embodied the "female element of the fundamental "essence of all-being" as represented by the Scarabæus enloined on the left Zodiac side.

As the mystic meaning of the Boats and hieroglyphics are not easily understood, it will be simpler to fully describe the corresponding Ancient Mexican Almanac Stone to show its uses.

The ANCIENT MEXICAN (Aztec) CALENDAR STONE.

AZTEC CALENDAR STONE.

(NOW IN THE NATIONAL MUSEUM OF MEXICO.)

Extracts from "Antiquities of Mexico," by W. W. Blake. Published 1891 by Messrs. Crawford, Printers, New York.

Page.

This is the most interesting and wonderful monolith in America—weight just over 24 tons. 6

Carved and moved by the Aztecs in 1479 A.D. (13 years before Columbus discovered America). 7

This rock was originally placed in a horizontal position in the eighth house of the great temple of Mexico. King Axayacatl invited the rulers of all the neighbouring friendly nations to be present at the ceremonies of its dedication, which took place in the year "Two House," or 1481 A.D. The THIRTEEN priests of the thirteen principal gods of Mexico (one for each of the thirteen years of the quarter cycle), armed with their obsidian knives for the sacrifice, ascended the stone before dawn of the day of its inauguration. 728 captives, reserved from those taken in the battle of Tliliuhtepec, decked with gay plumage, were placed near the stone. At sunrise a priest, with a smoking pot of incense, marched four times (for four Quarters, making up the cycle) round the stone, and then threw the pot upon it to be shattered to pieces. Immediately, King Axayacatl ascended to the rock and began the sacrifice by tearing the hearts out of the victims, throwing them into the stone vase mentioned by the historian Tezozomoc, and now in the National Museum of Mexico. When he had thus sacrificed 52 men (for the 52 years' cycle), he was followed by the 13 priests in succession until the 728 prisoners were slain. Tezozomoc says that Axayacatl drank of the blood and ate of the flesh of his victims to excess, and that his death, not long afterwards, was the direct result of this debauch. 8

This Stone Zodiac is 11 feet 8 inches in diameter. It is a mass of basalt, of fine grain. Alexander von Humboldt calculated its weight at 24,400 kilograms, or 53,792 pounds avoirdupois (24 tons). This enormous weight shows the immense difficulty which the Aztecs surmounted in transporting it several leagues to their temple. In order to explain the symbolical representations on this huge Calendar it is necessary to know that the Mexican year was divided into 18 months of 20$\frac{1}{4}$ days each, and these months into 4 weeks of five days each. 9

ANCIENT MEXICAN MONTHLY CYCLE of 20 DAYS.

ANCIENT MEXICAN YEARLY CYCLE of 18 MONTHS.

The months were as follows:—

No. 1	Abating Waters	Began March 1
,, 2	Victims Flayed Alive....	,, March 21
,, 3	Vigils of the Boys	,, April 10
,, 4	Vigils of the Men	,, April 30
,, 5	Drought	,, May 20
,, 6	Food from Maize	,, June 9
,, 7	Little Carnival	,, June 29
,, 8	Great Carnival	,, July 19
,, 9	Garlands of Flowers	,, Aug. 8
,, 10	Ripening of the Fruits	,, Aug. 28
,, 11	Cleaning of the Canals..	,, Sept. 17
,, 12	Grass Festival	,, Oct. 7
,, 13	Festival of the Volcanoes	,, Oct. 27
,, 14	Sacred Flamingo	,, Nov. 16
,, 15	Festival of the Banners	,, Dec. 6
,, 16	Retreating Sun	,, Dec. 16
,, 17	Cherishing Mother	,, Jan. 15
,, 18	House of the Light	,, Feb. 4

Each day had its name, viz.:—1, Dawn, 2, Wind; 3, House; 4, Lizard; 5, Serpent; 6, Death; 7, Deer; 8, Rabbit; 9, Water;

10, Dog; 11, Monkey; 12, Herb; 13, Reed; 14, Ocelotl; 15, Eagle; 16, Buzzard; 17, Path of the Sun; 18, Flint Knife; 19, Rain; 20, Flower. The 5th, 10th, 15th and 20th were market days. The year consisted of 365 days. The five intercalary days, February 24th to 28th inclusive, were considered very unlucky, were called nemontemi or "useless," and were spent in sacrifices, prayer, penitence, fasting, the men and women living apart from each other. —*Note this simple adjustment accords with the simplicity of the Coptic Calendar.*

One of the most interesting evidences of the astronomical knowledge of the Aztecs is this intercalation of five days in the calendar at the close of each year. Tradition says that this was the invention of one of their ancient astrologers named Cipac. The first day (Cipatetli) of each month was named in his honour. As the year was composed of nearly six hours more than 365 days, there still remained an excess, which they adjusted by interposing 25 days in every 104 years. This shows a nicer adjustment of civil to solar time than is presented by even the Gregorian Calendar, since more than 5,000 years would have to lapse before the loss of an entire day. *Note the first intercalation in the Mexican Calendar took place sixteen centuries previous to the arrival of the Spaniards. This event occurred in the most ancient city of Huehuetlapallan.*

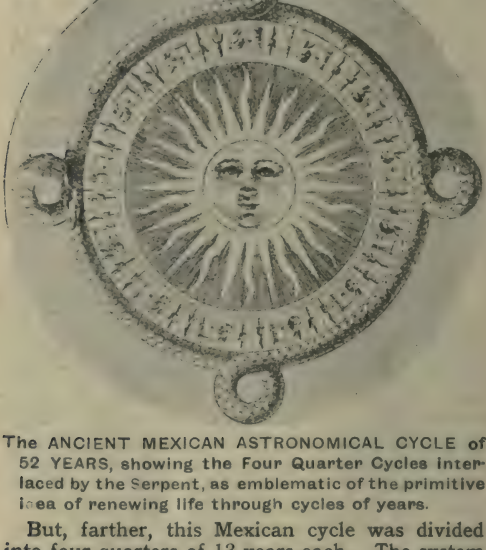
The astrologers assembled to correct the calendar in the year "One Flint," a date which according to received reduction tables corresponds to 29 B.C. Huehuetlapallan, "Old Earth-Paint," is located by some Mexican authorities at the present Casas Grandes, that mass of shapeless Desert ruins near the junction of the Gila and Colorado rivers, in Arizona.

However, I (W. W. Blake) fully believe that the city in which the shadowy ancestors of the present Aztec race developed and first corrected their calendar had its site in the Mound region of the Mississippi Valley, in the United States. Their traditions, their manuscripts, their monuments, all show an Exodus from the North—an exodus which required centuries of time to cover the period from their departure from the land of oppression until their arrival at the land of promise.—*Their Original home in the present Arizona Desert Region seems far more probable, as evidenced by the recurring Droughts so impressively and repeatedly mentioned in their records.—M. B. C.*

Page. 11

The true astronomical or solar year has been calculated to consist of 365 days, 5 hours, 48 minutes, 49·62 seconds. The Gregorian rule—by which all civilised countries, except Russia, are now governed—omitting 3 leap years in every 400 years, gives to a civil year an average duration of 365 days, 5 hours, 49 minutes and 12 seconds. This exceeds the true solar year by 22·38 seconds, and amounts to the difference of 1 day in every 3,866 years. But in the Aztec Calendar more than 5,000 years would have to lapse before the loss of an entire day. It will thus be seen that our Gregorian Calendar is not as near perfection as the Aztec. And see

how marvellously simple was the latter. So well adapted to the wants of the people that it could be readily understood and applied without great learning, so that even, with Cowper, we can say: "He who runs may read," or, with Habbakuk, "He may run that readeth it." It merely consisted in inserting 25 days into every 104 years. As the Mexican cycle comprised 52 years, these 25 days had to be fitted into two cycles in some manner, so they cut the Gordian knot by adding 13 days to the first cycle, 12 days to the second, 13 days to the third, 12 to the fourth, and so on, giving an even number of days to an even-numbered cycle and an odd number of days to the odd cycle. Is not this beautiful from its very simplicity?



The ANCIENT MEXICAN ASTRONOMICAL CYCLE of 52 YEARS, showing the Four Quarter Cycles interlaced by the Serpent, as emblematic of the primitive idea of renewing life through cycles of years.

But, farther, this Mexican cycle was divided into four quarters of 13 years each. The system of numbers was based upon multiples of four, and not upon a decimal notation as with nearly all other nations in the world. The names of the years were Tochtli, Rabbit; Acatl, Reed; Tecpatl, Flint; and Calli, House. These repeated constantly would cause the second series of years to begin with Reed, the third with Flint, and fourth with House—an ingenious arrangement by which could be designated clearly any year in the cycle. Thus the 52 years of each cycle bore the following names:—

52 YEARS' CYCLE.

1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.
1 –1 Rabbit.	14 –1 Reed.	27 –1 Flint.	40 –1 House.
2 –2 Reed.	15 –2 Flint.	28 –2 House.	41 –2 Rabbit.
3 –3 Flint.	16 –3 House.	29 –3 Rabbit.	42 –3 Reed.
4 –4 House.	17 –4 Rabbit.	30 –4 Reed.	43 –4 Flint.
5 –5 Rabbit.	18 –5 Reed.	31 –5 Flint.	44 –5 House.
6 –6 Reed.	19 –6 Flint.	32 –6 House.	45 –6 Rabbit.
7 –7 Flint.	20 –7 House.	33 –7 Rabbit.	46 –7 Reed.
8 –8 House.	21 –8 Rabbit.	34 –8 Reed.	47 –8 Flint.
9 –9 Rabbit.	22 –9 Reed.	35 –9 Flint.	48 –9 House.
10–10 Reed.	23–10 Flint.	36–10 House.	49–10 Rabbit.
11–11 Flint.	24–11 House.	37–11 Rabbit.	50–11 Reed.
12–12 House.	25–12 Rabbit.	38–12 Reed.	51–12 Flint.
13–13 Rabbit.	26–13 Reed.	39–13 Flint.	52–13 House.

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But the Aztecs did not devote these four signs —Rabbit, Reed, Flint, House—to the naming and enumerating of the years alone. In the

table below we see how with these four symbols they united in admirable combination their cosmogony, theogony and chronology :—

Sign.	Year.	Day of Month.	Cardinal Point.	Planet.	Season.	Colour	Age of the World.	God.
Rabbit	1	8	South	Earth	Autumn	Green	Earth	Chimalma
Reed...	2	13	East	Moon	Summer	Red	Water	Texcatlipoca
Flint...	3	18	North	Sun	Spring	Yellow	Fire	Xiuhtletl
House	4	3	West	Venus	Winter	Blue	Air	Quetzalcoatl

Within the innermost circle of this Zodiac, the great face, its sacred mask, circular ear-drops, stone necklace, protruding tongue—all are a representation now very well known of Tonatiuh, the Sun. The sign Ome Acatl, which it bears upon its forehead, refers to the year Two Reed. The symbol One Rabbit with which they begin their cycle was considered as an evil omen, because of the mortality occasioned by the great droughts that accidentally occurred on the years corresponding to this symbol. The tribe to remedy this resolved to reform the calendar, transferring to the year Two Reed the commencement of each age. This correction was made in the year 1454 A.D. as here shown.

The second large circle contains four parallelograms, indicating in Aztec mythology that the Sun had died four times. The Mexicans had changed somewhat the order of chronographic signs from that adopted by their shadowy predecessors, the Toltecs. The latter divided the four great Ages, or "Deaths of the Sun," as follows :—1, Age of the Water; 2, Age of the Earth; 3, Age of the Fire; 4, Age of the Air. Then followed the Aztecs or Mexicans with - 1, Age of the Water; 2, Age of the Air; 3, Age of the Fire; 4, Age of the Earth. These ages may be interpreted as follows: Age of the Water, submerging of the continent of Atlantis; Age of the Air, the Glacial Epoch, embodying their traditions of the ice-bound lands of the North from which their forefathers had come; Age of the Fire, eruptions of the volcanoes with their accompanying earthquakes; Age of the Earth, beginning 4431 B.C., and ending 1312 A.D.

Page. 15

The entire face of the rock was painted red to indicate that it was dedicated to the SUN, and there are even traces yet of the colour remaining after a lapse of 411 years.

The celebrated Mexican archæologist, Don Antonio Leon y Gama, described this stone in 1792. He named it "The Aztec Calendar," a name which still clings to it. The Indians on the streets of Mexico to-day call it "El Relox de los Indios," or the "Indian Clock." In 1876 Chavero re-baptised it, and correctly, "The Rock of the Sun."

Leon y Gama said that eight holes for the insertion of gnomons or dials could be found just outside the outer rim on the face of the

16

stone. This statement went unchallenged for over three-quarters of a century. In fact, but four holes exist. He further said that this stone shows clearly the following dates :—Vernal Equinox, March 22nd ; Summer Solstice, June 22nd ; transits of the Sun by the Zenith, May 22nd and July 26th, and the Autumnal Equinox, 22nd of September—the first two occurring on the year Thirteen Reed, and the last three on the year One Rabbit.

Whilst his premises were erroneous and therefore his deductions false, we can say this in defence of the theory of Leon y Gama : when the rock was placed in its proper horizontal position, with its meridian arrow pointing to the South, styles fitted perpendicularly into the four holes could be made to give the following results :—The tip of the nose in the central face being assumed as the central point in the stone and to correspond with the latitude of Mexico—an East-and-West line between the two Northern styles represented the Tropic of Cancer. An East-and-West line between the two Southern styles—being farther from the centre – represented the Tropic of Capricorn. In the Summer Solstice the shadow of the North-Eastern style at sunrise fell on the central point, and at sunset on the same day the shadow of the North-Western style fell on the same central point. The same occurred with the other two styles during the Winter Solstice. Threads stretched between the Northern styles in Summer and the Southern in Winter would, on the Solstitial Days, throw a shadow falling exactly in the centre of the stone from East to West. During the Equinoxes the shadow from one style would strike its companion style at sunrise and sunset, and lie exactly beneath the thread. Thus the dates of the Solstices and Equinoxes could be accurately ascertained. To fix the passage of the sun—to express it thus—through the zenith of the City of Tenochtitlan, it sufficed to stretch a thread from the North-East to the South-West style, and from the North-West to South-East style, since the shadow of the point of intersection of the two threads would fall at mid-day in the centre of the stone, and the four styles would give forth no shadows. (*This is a counter-application of the square observatory like York Minster Tower, as outlined in my explanation of Jacob's Amplitude Observatory. – M. B. C.*)

The resemblance between the Aztec Calendar and those used by the Oriental nations is striking. The Chinese had 60 years in their cycle, in 5 divisions of 12 years each, and the names of the years were :—1, Mouse ; 2, Ox ; 3, Leopard ; 4, Rabbit ; 5, Crocodile ; 6, Serpent ; 7, Horse ; 8, Sheep ; 9, Monkey ; 10, Hen ; 11, Dog ; 12, Hog. The Tartars, Japanese and Thibetans have nearly the same, but substituting—3, Tiger ; 5, Dragon ; 8, Goat. In the Mexican signs for the days, we meet with Rabbit, Serpent, Monkey, Dog. Instead of the Leopard, Crocodile and Hen—none of which were found in Mexico they had

Ocelotl, Lizard and Eagle. Both the Asiatics and the Aztecs indicated the year by its sign, as the "year of the Rabbit," etc. In the lunar calendar of the Hindoos seven of the terms agree with the Aztecs, viz., Serpent, Reed, Monkey, Flint Knife, Path of the Sun, Dog, House.

The Java Islanders also regulated their markets by a week of five days, having besides one week of seven. The Persians had a cycle of 120 years of 365 days each, at the end of which they intercalated 30 days. The ancient Etruscans arranged their calendar in cycles of 110 solar years, and reckoned the year at 365 days, 5 hours, 40 minutes.

It is a curious fact that the number of sacred months of 13 days each, contained in a Mexican cycle of 52 years with the intercalation, should correspond precisely with the number of years in the great Sothic or dog-star period of the Egyptians, namely, 1461, a period in which the seasons and festivals came round to the same place in the year again. The coincidence may be accidental, but Prescott well says that a people employing periodical series and astrological calculations have generally some meaning in the numbers they select and the combinations to which they lead.

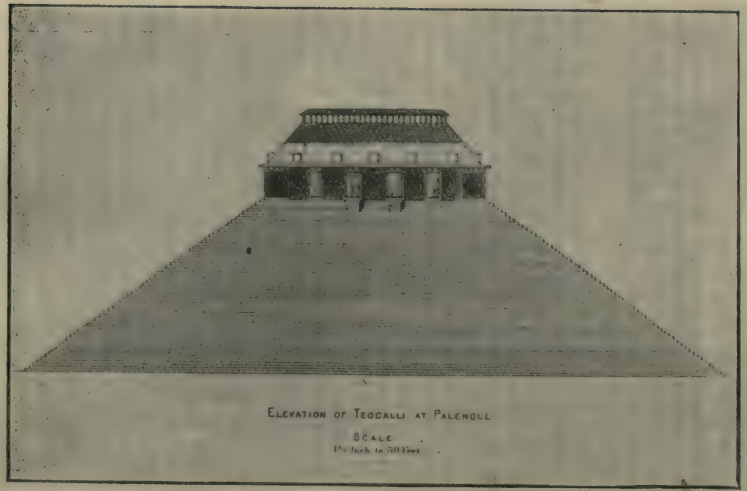
Page.

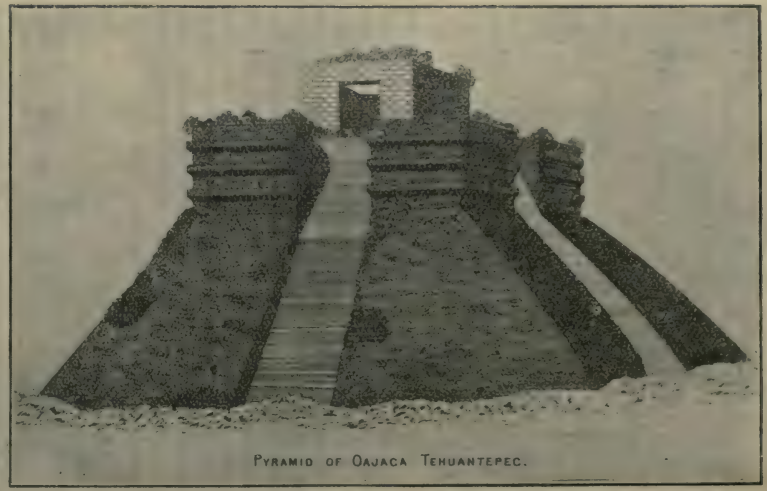
41 Just as many people to-day believe in the influence exercised by the planets upon human events, so the Mexicans had the same credence respecting the symbols, with which they designated their years, months and days. The hieroglyph "One Rabbit," with which they had fixed the beginning of their cycle in Huehuetlapallan in the year 250 B.C. had come to be considered as unlucky because of the mortality occasioned by the GREAT DROUGHTS that accidentally occurred in the years corresponding to the said symbol.

42 Not only did the Mexican astronomers comprehend the necessity of intercalating days in their cycles—after the manner of our leap years—but they knew that representing the decimal 0·25 of a day in each year would not bring perfect exactness in the reckoning since the true decimal is 0·24242424242. Thus by their calculations they arrived at the knowledge—most wonderful for a people that had no adequate instruments—that in computing the correction for the 1,716 years of their past 33 cycles they had gained 13 days. To correct the error they did what the Europeans did afterwards in the Gregorian Calendar, they suppressed the 13 days in excess—as the Russians will now have to do.

The distinct references to Mexican shadow methods on the preceding page call to mind the significant fact that these wonderfully exact Ancient Calendar records are found amidst the Mexican Pyramids, by which the essential observations were doubtless made through studying Sun-shadows.

The fact that the Ancient Egyptians and Mexicans thus both secured such exact systems of Calendar Time is important for our study of the Evolution of the Almanac.





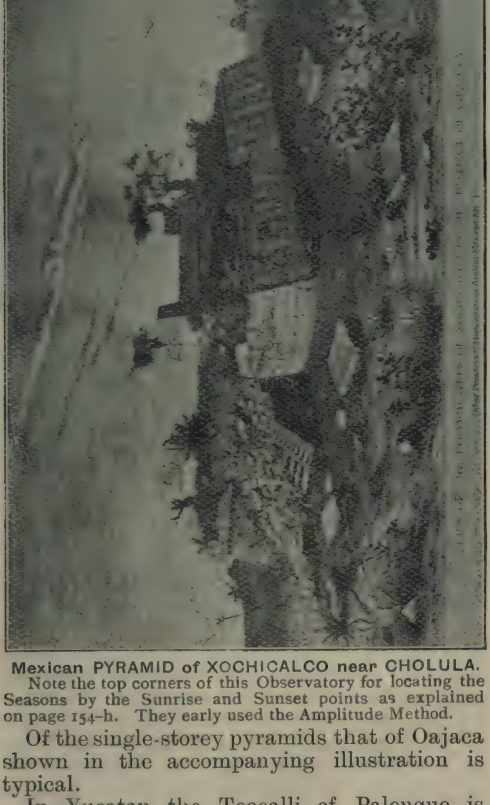
TEOCALLI at PALENQUE. **(PYRAMIDS of MEXICO.)** PYRAMID of OAJACA.

By kind permission from Mr. St. John Vincent Day's "Pyramids" (Edmonston & Douglas, Edinburgh, 1869).

They consist of Soil and Stone without any interior chambers, and were always surmounted by an Observatory or Temple.

These also are truncated and represent a stage of development between the great Mound builders of the Mississippi Valley, Asia Minor, etc., and the Egyptian Pyramids which were complete in themselves.

The largest and probably the oldest is that of Xochicalco, Cholula—about 1,440 feet square and 177 feet high, built in four storeys composed like the Pyramids of India at Benares, etc., of badly burnt bricks and mud, now partly overgrown with trees.



Mexican PYRAMID of XOCHICALCO near CHOLULA.
Note the top corners of this Observatory for locating the Seasons by the Sunrise and Sunset points as explained on page 154-h. They early used the Amplitude Method.

Of the single-storey pyramids that of Oajaca shown in the accompanying illustration is typical.

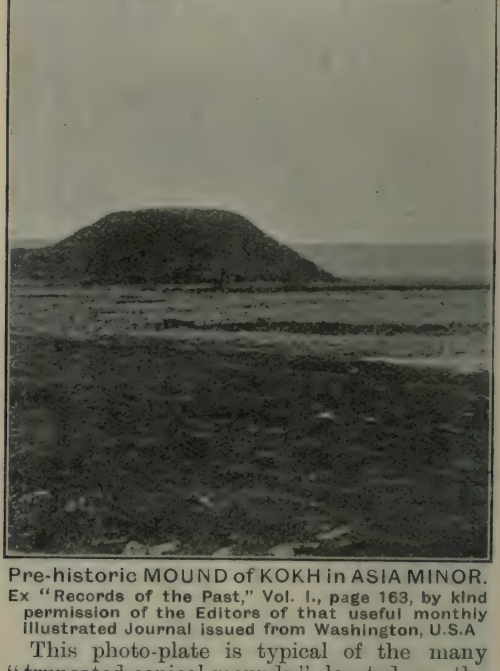
In Yucatan the Teocalli of Palenque is similarly built, but is less imposing, its height being only 85 feet.

As my space is limited, these may suffice to exemplify the Pyramids beyond those of Babylon, Egypt, etc.

To me it seems a most significant fact that the Pyramid Builders were confined to Latitudes within 35° where the SHADOWS were sufficiently strong to record, whereas the Mound Builders began about 35° and ranged to higher Latitudes, where shadows were too weak for exact records, therefore they had to depend upon "sighting-methods" most easily applied by building Mounds and erecting "sighting-staffs" thereon.

I therefore draw particular attention to the fact that all those Pyramids of Egypt, Babylon,

India, Mexico, are within about 35° from the Equator. Beyond those Latitudes we find huge pre-historic Mounds built by primitive men, as here illustrated and further exemplified in the *Addenda*.



Pre-historic MOUND of KOKH in ASIA MINOR.
Ex "Records of the Past," Vol. I., page 163, by kind permission of the Editors of that useful monthly illustrated Journal issued from Washington, U.S.A

This photo-plate is typical of the many "truncated-conical-mounds" located on the Plains in the Ancient Hittite and Haldi Country West of the Euphrates, especially near Kharput, where 15 are found within that great bend of the Euphrates. In size they vary from 1 to 6 acres, and from 30 to 80 feet high. I believe that they were used as Observatories by the method shown in the *Addenda*. The "sighting-staffs" erected upon the truncated top were visible to all the workers in the District, who could thus know their daily times for meals, etc., when the Sun shone, and even when the Sun was obscured the Priests or Chiefs could climb the mound and ring the calls to work and meals, and also use the elevation as a platform from which the Seasons could be registered by the Amplitudes of Sunrise and Sunset on the thus extended horizon.

The resemblance between these and our greater Silbury Hill illustrated in the *Addenda* is very striking, and, like it, they are artificial, and pre-historic implements have been found in their distinct layers of human construction. The French "Gilgal" shown in *Addenda*, *page V.*, is another example.

Unfortunately my limited time did not admit of a visit to the Mounds of Kokh, Alyattes, etc., in Asia Minor on my way home from Syria, as I should have liked, because they are typical of the great Season-finding Observatory Mounds which extend from England through Central Europe, Central Asia and the Mississippi Valley of the United States of America.

TOTEMS, not mere TOMBSTONES, but useful GNOMONS, showing the TIME by SHADOWS and reminding passers of the "FLIGHT OF TIME," which should be used for the BEST.

AMERICAN garden "TOTEM" or SUN-DIAL (by the kind permission of P. Henderson & Co., Seedsmen, New York).

This reproduction of the garden-dial may serve to explain the origin of our clocks, for which the course of the shadow cast by a vertical style upon such horizontal dials naturally suggested the circular motion of the hour-hand, and the sub-division of the dial into 6 hours of 15° from Equinoxial sunrise at 6-0 a.m. to NOON (when the shadow is on the Meridian, denoting mid-day), followed by 6 equal hours to the Equinoxial sunset at 6 p.m.

This again emphasizes the great importance of the Equinox to the rulers of ancient peoples, whose necessarily regular times for slave-labour, government, courts, meals and indeed all the innumerable uses of national life depended on these shadow-methods.

The priests knew that in the 6 Winter months the sunrise and sunset shadows fell North of the East and West line marked by 6 a.m. and 6 p.m., whilst during the Summer the sunrise and sunset Shadows fell South of that line on which depended their needed regular hours of fixed length throughout the year. That has been such a valuable factor for regulating our daily lives, that only those who have experienced the confusing and wasteful practice of the Arabs (who still count

their year by the moon and divide the sun's time above the horizon into 12 hours (graduated so that at mid-summer their hours are about twice as long as those of mid-winter), can partly realise the value of equal and regular hours.

That vertical Stone and Garden dial, together with the photograph of the Mexican Calendar Stone (which is typical of the Sun's orbit outlined as a circle), may enable us to appreciate the vast importance originally attached to vertical circles of stones erected by the Ancient Druids, Worshippers of Baal, etc., throughout the World, as they were not only their Observatories where the learned men of their day resided, but also constituted their schools, universities, and government centres, where the rising generation of future Chiefs and Rulers were trained at these necessarily fixed and Orientated stones, in those practical methods of locating the Seasons and daily times essential to the highest welfare of the people.

The same reason explains those hitherto inexplicable "Round Towers of Ireland," which were built to much greater heights when the Celts had learnt the art of building hewn-stone and brick erections. Their significant high loop-hole windows, carefully orientated to the North, South, East and West, clearly manifest their Year and Season-finding purpose, whilst the high chimney-like Tower by its shadow recorded the daily time required to govern their administrative and domestic arrangements for all in their several localities.

By comparing the erections opposite with the Vertical Stones in the middle (which it may be seen more crudely answered the Shadow-Season or Almanac-finding purpose of these straighter built Celtic Towers) we may realise how they possibly developed in their numbered order to the minaret style No. 9, whereon we may note the same Church-top ornament which spoils the appearance of the Ancient Egyptian Obelisk in front of St. Peter's at Rome. The cross topping No. 5 is also significant of Church use.

The conical pointed tops seem designed to cast the desirable Shadow as a Time-indicator in the Summer, but obviously the Priests would during Winter have to rely upon Almanac records checked by the Observations of Sunrise and Sunset taken from the Top of Tower, as they could not then get such reliable shadow records as were available in Egypt.

There existed in Ireland about 120 of these Towers, tapering towards the top, with conical roofs, and rising from 60 to 132 feet, that at Kilcullen being the highest. Most are now ruined, but about twenty are almost perfect. They were built either near or adjoining churches between the 8th and 13th centuries.

It is remarkable that the jambs of the doors and windows frequently slope narrower towards the top like the doors of Ancient Egyptian Temples.

3 4 5

1 2

7 8 9

EXAMPLES of IRISH, etc., ROUND TOWERS.

Other examples exist near Peel Castle (Isle of Man)—also three in Scotland (at Abernethy, Brechin and Egilshay (Orkney Is.)

Similarly "Round Towers" are built to Churches in Norfolk, Suffolk and Essex, whilst throughout Europe and the Islands of the Mediterranean similar erections, wider and lower than the Irish in proportion, appear to have been built by pre-historic races. Then from Turkey Eastwards minarets are found, which culminated at Delhi (India) in the beautiful Kootub Minaret, at least 250 feet high.

That great Irish Archæologist, the late Mr. Petrie, rightly says "these Round Towers "served the joint purpose of Belfries and "Fortalices," but to trace their origin we must go much further back to the pre-historic times, when tribal priests had to regularly trace the Seasons through each year by noting through the orientated windows the Amplitudes of Sunrise and Sunset, and deriving their daily times by Shadows cast from such Towers, which thus became sacred, and as Bible, etc., history shows, led to their giving "sanctuary" to refugees and even fugitives from justice: for which purpose they were strongly built when near the borders of conflicting races.

Their significant feature is in the Windows placed N., S., E. and W. to watch the Seasonal Amplitude by noting the Sunrise and Sunset points as shown on the York Minster diagram (page 154-h).

The idea of N., S., E. and W. orientation may be readily understood by noting that we can see straight through both the North and South apertures of St. Kevin's (Kitchen) Church Tower shown upon the next photo-block.

How naturally these Ancient Towers suggested the idea of our present conjoined Church Towers may be seen from the following photograph of

The IRISH ROUND TOWER at GLENDALOUGH, in the midst of the 7 CHURCHES, where its upper storey and apex has been copied for the Tower of the Ancient St. Kevin's Church here shown with a Round Tower, supposed to be the earliest, built in as a Church Spire.

The ROUND TOWER of ST. KEVIN, 110 feet high and 51 feet in circumference, at Glendalough (Co. Wicklow), Ireland.

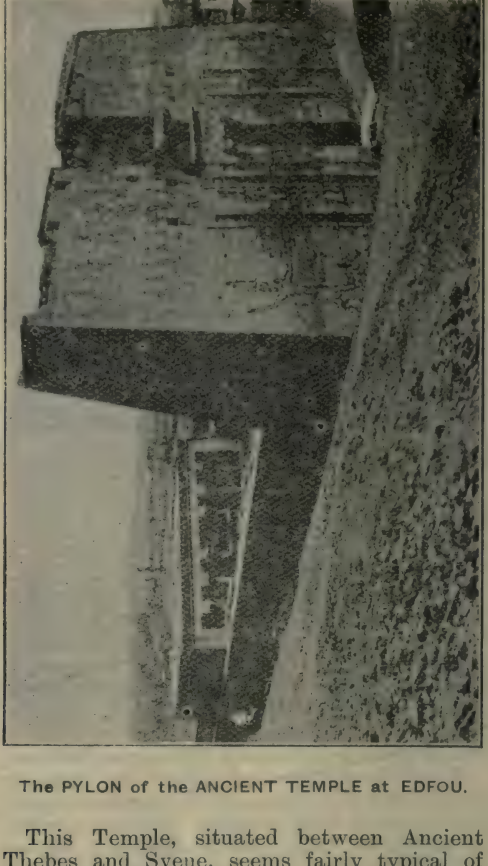
This is a nearer photograph of the Tower shown beyond the Church in the previous picture. This typical style of Tower with the entrance door so far above the ground is characteristic of Irish Round Towers.

The Tower adjoining Kildare Cathedral is still open at the top for Observatory purposes, and has happily been kept intact with movable steps to the door about 30 ft. above the ground. The higher rings of stone projecting inwards to support the floor stages and zig-zag steps to reach the top, show how it was used when occasionally occupied as a "Tower of Refuge."

Thus they were first Season or Almanac finders, and then became "Towers of Refuge," shielded by that sanctity of the Church of which we read, as still evidenced by the fortified Church Towers still existing near the borders of Wales, Scotland, etc.—Being high and ready to resound the call of the priest for the assembly of the people in times of danger, or to call the congregation at precise times before clocks and watches were known, just as the "Museen" now call the Faithful Moslems to prayer from the Turkish Minarets. —They were naturally appropriated as "Bell Towers" when Church Bells were introduced. [Now we have precise time by watches, etc., the undue ringing of bells during hours when other congregations are worshipping might reasonably be discontinued as the ringing has largely lost its use. Naturally the clergy hesitate to break away from the old tradition.]

From this we may understand how easily in more peaceable times these Church Towers came to be built up more economically as part of the Church building, where the Belfry could be more conveniently worked, whilst the ringer could also guard the inside of the Church.

Later, as the more pointed style of Church Architecture developed, the tapering Spires were extended as "Sun-sighting pointers," till now we are everywhere more familiar with those "Sky-pointers to better things above," than with their original purpose of more practical use below—as recorders of Time by their Shadows, as Sun-dials were later used on Churches here and Obelisks used in Egypt.



The PYLON of the ANCIENT TEMPLE at EDFOU.

This Temple, situated between Ancient Thebes and Syene, seems fairly typical of Egyptian Temples. Its high elongated pyramidal front, called the "Pylon," is particularly significant, because the 4 inset squared vertical sockets, paired on each side of the entrance, unmistakably demonstrate the fact that the Egyptians used Shadow-poles to indicate their daily and Seasonal Times where Obelisks were not present, just as the British Druids (as per Addenda, page 1) used Shadow-poles to indicate precise times for Observation at Stonehenge.

As the Pylon approximates the almost vertical Summer Solstice Slope evidenced by the Pyramids of Meroe, the sockets for the Shadow-poles begin mid-way up the Pylon, and to secure verticality are cut gradually deeper as they descend to the bottom.

It is still more interesting to notice in the upper half of the Pylon directly above each socket, the corresponding pairs of square holes through which adjusting blocks would be driven to hold the upper parts of the Poles vertically in position and probably lash their spliced parts together, as the short Egyptian trees would need splicing and staying to reach great heights.

The 8 pairs of smaller step-like holes equidistant up the centre of both the right and left halves of the Pylon appear to evidence a still higher use of the Pylon, as they indicate the use of a further set of poles for continuing the Pylon's Angle of Slope far above the height of the Pylon, on the top of which the higher section of the poles would be lashed and further supports socketed, as I found in the case of the Druidical Monoliths at Aldborough—photographed on page 10.

The cup-like well-drained socket-holes on the top of those stones led me to believe that such monoliths were used as weighting stones, to give permanent solidity and raise their pole tops to the highest possible limits, as I think the Egyptian priests at Edfou, etc., did with their Pylons, specially arranged to secure masses of Timber sufficiently high and broad to cast definite shadows of sufficient length to denote the weekly progression of the Seasons, to reasonably meet practical needs by similar Shadow records to those used by the Great Pyramid priests. Their increasing wisdom apparently led these later builders to economise labour by these truncated Pylons by similar means to those used at the truncated Silbury Hill as detailed in the Addenda.

Even where these Eastern Temples had Pylons facing the East, the pairing shadows cast from such Shadow-poles or Obelisks set in pairs, would meet on the meridian-line at Noon precisely, just as the hour and minute-hands of our clocks then meet.

The fixed Angle of the Sun-dial and all shadow methods of recording Time was unavoidable, and though it was known that such dial hours were not exactly equal in length of time, no better system was available till clocks were invented.

That reminds me of the fixed 15° difference per hour (90° ÷ 6 hours from 6-0 a.m. to 12-0 noon) shown on the Ancient as well as present Sun-dials, which 15° per hour is still identical with astronomical and practical Time allowance throughout the World, as experienced by voyagers across the Atlantic and evidenced by the 1 hour changes of Trans-continental "Standard Time" required for exact Railway, etc., working across Europe and America.

Thus we see how the great Time factors of Ancient philosophy applied to practical life in the Old World all worked in cycles, graphically outlined as circles typified by our Dials, Clocks, Watches, Zodiacal circles, etc.

The reproductions on page 256 of the Time-circles so characteristic of the Ancient American civilizations as traced by Archæologists in Mexico, are very similar to those used by the Egyptians, Assyrians and other Ancient Peoples.

The following reproduction from the *Encyclopædia Britannica*, Vol. II., page 777, outlines the Ancient ideas of the Circular motions of the Planets, and evidences the truer astronomical knowledge of the Egyptians long before the rise of Greek Science :—

Far more reasonable was the ancient Egyptian system, by some described as identical with, but in any case closely

FIG. 18.—Ptolemaic System.

resembling in essentials, the system of Tycho Brahe, shown in fig. 19. Here the earth is the centre of the motions of the sun and moon, but all the planets circle around the sun, Venus and Mercury moving in orbits passing between the earth and sun, while Mars, Jupiter, and Saturn move in orbits passing outside the earth. All the observed movements, and all the peculiarities of the observed relations, were fully explained by this system. Indeed, a

Tychonic system.

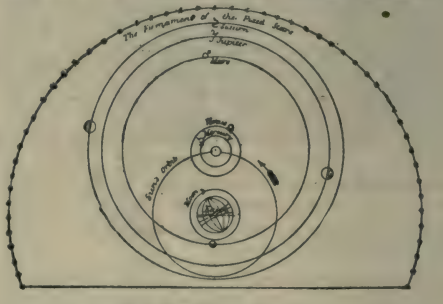


FIG. 19.—Tychonic System

little consideration will show that the geometrical relations are precisely the same for such a system as is depicted in fig. 19, as they would be in the system pictured by removing the circle showing the sun's orbit in fig. 19, and substituting a circle of equal size around the sun as centre and passing therefore through the centre of the earth. It is not too much to say that Tycho's system is not only fully equal to the Copernican in its fitness to explain the observed relations, but that, until the law of gravitation had been established, the arguments for the Tychonic system, modified so as to correspond to Kepler's discovery of the shapes of the different orbits, were almost equal in weight to those used by the disciples of Copernicus. The slight advantage of the Copernican system in point of simplicity was counterbalanced by the difficulty of accepting, in those days, the belief that the stars lie at so inconceivably vast a distance that the motion of the earth in an enormous orbit around the sun. ———— produced no perceptible change in the appearance and apparent rotation of the star-sphere.

(By kind permission of Messrs. A. & C. Black, of Edinburgh, and "The Times" Proprietors.)

From these circles we see how the circular idea was impressed upon the Egyptians of the Middle Empire by their direct star observations following the circular motion of Sun-Shadows which so engrossed the attention of their ancestors during the Earliest Dynasties.

The SPHINX and GREAT PYRAMID, showing on the latter the pointed Shadow of the 2nd PYRAMID cast on the 6th December, 1900, at 5-30 p.m., from a distance of about ⅓rd Mile, or 550 yards. Aly Gabry, the noted Pyramid Guide, stands on my left.

The Sphinx is also very nearly ⅓rd mile from the Great Pyramid here photographed to show the Shadows and how the immense pyramid height of 484 ft. seems so diminished to sight by its slope receding with the lines of vision in that rarified air, even when such a fixed raised gauge of height is there furnished by the 30 ft. depth of the Sphinx's face from brow to chin. The shadow of the Sphinx is ranged on the sand-drifts behind the camel.

This photograph shows how even Sunset Shadows near the Winter Solstice could be used, and as the 2nd and Great Pyramids are situated almost exactly on the same diagonal line (as seen at the foot of page 70) they may have been so used to register Sunset Shadows.

The traditional story is that an "Oracle" foretold that the Sphinx (a beautiful woman) would destroy herself on one of her supposed unexplainable enigmas or riddles being explained, by a visitor who, on being asked by her "what animal walked on four legs at morn, "two at noon, and three in the evening?" correctly answered "man," referring to infancy,

manhood, and old age, whereupon the Sphinx in a rage killed herself against a rock, and was turned into stone—hence the Stone Sphinx.

That may satisfy credulous persons, but this huge beautifully carved figure, which has held spell-bound myriads of people through countless generations, seems to have been designed as an Amplitude Observatory by thoughtful earnest men, who thereby sought to trace out the Seasons to advance the welfare of their race, by ensuring regular crops for the people's food, as the first essential to the existence of a community attempting to live a more settled life than their Nomadic Ancestors.

The situation chosen on the Gizeh plateau was ideal, as the stone escarpment provided the solid stone for carving before men had learned to saw stone and build by cementing smaller blocks together. Westward there was the boundless desert, formerly producing vegetation (as per page 286), for their pastoral flocks and herds, whilst Eastward lay the fertile valley of the Nile, providing a plentiful supply of water near which abundant crops could be grown with the least possible labour, —provided the toilers could be assured of the right times for sowing the various crops needed.

Probably that remarkable rock had been resorted to by their desert-roving ancestors when camping near, in order that they might from behind its fixed position watch the seasonal points of sunrise as their best means of knowing when to sow their crops, as it was absolutely necessary to have a fixed observatory station, because during their desert wanderings they could not locate the essential East direction without such a fixed point as the Sphinx rock provided at one end of the East "sighting-line" which extended to the East point thence seen on the crest of the Mokattam Hills bounding the horizon beyond the Nile.

Therefore their first great work appears to have been that of carving out this great natural rock to sight therefrom the ever-changing sunrise points throughout the Seasons, as explained for Jacob's Amplitude Observatory on pages 154, etc. That great sighting-gauge overlooked the ten mile level of the Nile Valley, beyond which the serrated Mokattam Hills were extensively ranged as a ready gauge more permanent than Jacob's stakes.

The Sphinx statue as a human-headed lioness, seated, with head erect, 100 ft. high, and the body 140 ft. long, is admittedly the oldest monument in Egypt. I believe it was designed and used to determine the Seasons long before the more advanced "Pyramid method" was thought of, because the "Amplitude" Observations of the Sun on the horizon were naturally first suggested to men, who had to find out for themselves the Seasons which controlled their yearly supply of food upon which their lives depended, as explained on Almanac page 1.

When the Sphinx is viewed from the *East* (as it is almost invariably shown in photographs and illustrations) its appearance is so

striking that the attention of travellers has been absorbed by that view already shown.

My previous experience, based upon a long series of experiments with sighting-staffs, shadows, etc., proved that the most primitive means early men could employ to trace out the Seasons by the Sun's movements was to observe and record the points of Sun-rise, as explained in the origin of "Jacob's Era," on page 150.—Therefore, on arriving at the Sphinx it was but natural for me to carefully view that mysterious object from the *West*, when I was most strongly impressed with the belief that the great object for which it had been used thousands of years ago was to trace the yearly progress of the Sun by recording the points of Sun-rise as they are so vividly seen and differentiated by the long series of undulations formed by the Mokattam Hills, which fringe the Eastern horizon about 10 miles distant upon the other side of the beautiful level Nile Valley.

No more ideal position for such an Observatory could be found. The situation of the great Phœnician Sun Temple with its several wrought stones weighing about 1,000 tons each at Baalbeck, near Damascus, appealed to me as remarkably fine; but the glorious Sun-rise we witnessed in December, 1900, at GILGAL, which marks the first Observatory of the Israelites after they crossed the Jordan, was the nearest comparative site I could call to mind as at all comparable to the ideal site of the Sphinx.

GILGAL lies on rising ground to the West of the wide, level Jordan valley, across which a beautifully clear view is obtained of the Sun-rise points, as they are discerned most distinctly marked on the semi-circular range of undulations which rise in the Haurân District, East of Jordan, and bound the Eastern horizon.

The limitations of this small book prevent fuller explanation of Baalbeck, Gilgal, etc., but their kindred merits as primitive Observatories for locating the Seasons seem so closely in unison with that of the Sphinx that the remarkable similarity should be noted.

The photo-print of the Sphinx here reproduced was taken to prove the exceptional reasons which led to the choice of this remarkable site. The view is taken from the S.W., to show the body of the Sphinx and the gradual fall of the level from the Western background near the Pyramids to the level Nile Valley below, which extends beyond. From that readers may rest assured of the fact that the site was admirably suited to enable the Sphinx Priests to watch and record the Seasonal points of Sun-rise.

The latter view of the Sphinx and Pyramids, taken from the N.E. during the Nile's Inundation, as first seen on approaching them from Cairo, emphasizes the vast expanse of water-level area over which the long-distance ranges of the Sun-rise could be so splendidly defined upon the Mokattam Hills beyond Cairo.

Rear View of the SPHINX, looking towards the NORTH-EAST across the NILE VALLEY to the Mokattam Hills, about 10 miles distant. Note the morning sun disced on the head of the Sphinx, thus used to mark the position of the Sun. The indicative lines radiating from the nape of the Sphinx's neck to the Sun-rise points unfortunately are not visible in this photo-block.

The little palm-grove villages, on artificially raised mounds, which dot the landscape like islets in the Nile area, do not in the least obstruct the view from the Sphinx, as its higher position on the *Western* bank ensures an uninterrupted East view as far as the eye can travel. That view seems perfect when taken from the rear of the Sphinx, which appears to have been used as a huge indicator to locate the Seasonal Sun-rise points which could best be determined from such an elevated position directly facing an extensive level plain, or better still, as we have here a vast expanse of water towards the East, and bounded by high serrated hills as landmarks upon the horizon.

The view from behind the Sphinx most remarkably confirms this conclusion, because the peculiar curved ridge-lines which are cut so suggestively over the back of the Sphinx's head seem purposely radiated to the Sun-rise points from the back of the neck to the forehead and ears.

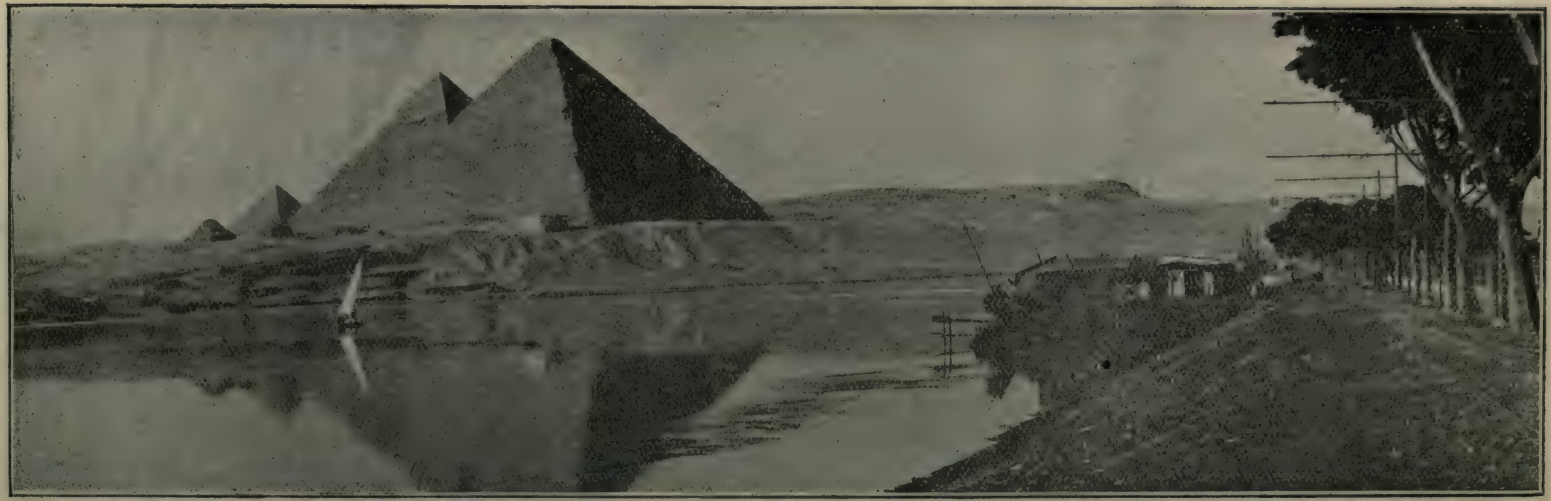
That fact would have been made clearer to the reader by the photograph which I took from that standpoint, but unfortunately a wily Arab stole it, with other Pyramid photographs I highly prized, from the carriage whilst I was discussing the Pyramid question with Professor Maspero in the Gizeh Museum on my way back from the Pyramids. That, however, with other objects of interest, may be issued in a later edition.

I have twice tried but failed through visitors to get a view of those radiating lines which I saw so distinctly upon the back of the Wig of the Sphinx, therefore as the printers are waiting to go to press I must ask the reader to kindly accept my assurance that they exist.

The Sphinx was cut out of the solid rock, which the strata on the corresponding hill to the South shows would most easily lend itself to the purpose. Originally it was surmounted by a crown, formed from a separate block of stone, which was probably marked by pointers in extension of the radiating lines I have already described as most distinctly marked upon the "wig" which covers the back of the skull.

The **position to gauge the Sun-rise,** straight North and South **shape of wig and chest, to define the mid-day point of the Sun's Seasonal elevation,** its dedication to the Solar deities through both the King and Queen as embodying the regal splendour of the Sun, with all the scraps of hieroglyphics, tradition and deduction handed down to us, proclaim that such was the purport of this great primeval "Rock Sculpture" work of early men.

The figure has been held to represent the King (directly descended from the Sun) as the Egyptian deity "Ra Harmachis," who was the *Solar deity*, as seen in the expanded Sun on the horizon at Sunrise.—The Coptic name



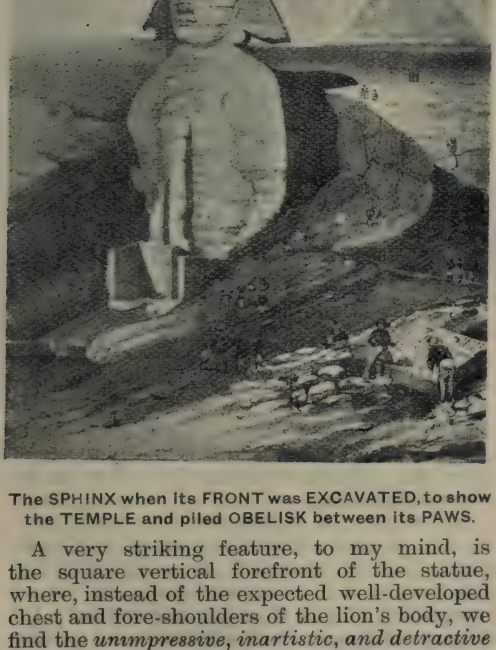
This View of the GIZEH PYRAMIDS during the INUNDATION shows the SPHINX in truer perspective, as a small figure above the tip of the boat's sail then sailing over the Nile-Inundated fields behind the village. The dark patches appearing through the water between the reflection of the Great Pyramid and the posts near the house, show the cultivable land re-appearing as the Inundation falls.

for this peculiar creation was Sesheps, held sacred to the goddess Hathor, who is always shown with the *Sun-disc* over her head, and was supposed to preside over the birth of Princes during those early times when the Kings claimed direct descent and power from the Sun, as already referred to in "Sun-worship."

The terms *Sun-worship* and *disc-worship* convey the same idea when applied to the earliest form of Egyptian religion, which was founded on the study of the Sun's movements and power directed to the benefit of men.

During subsequent centuries the drifting desert sand has evidently greatly increased the depth of sand around the Sphinx, as, although it was formerly the centre of an extensive open amphitheatre. all that together with nearly three-quarters of the depth of the Sphinx, is blocked up by drift-sand, so that usually only about 30 ft. of the height below the neck and head can be seen.

The vast bulk of sand has, however, been scooped out on special occasions (as when the Suez Canal was opened, etc.), when a full view of the figure was obtained, as shown in the vertical picture. As that opening it to view caused several men about a year's constant labour, and it soon afterwards drifted full again, it proved too expensive to keep open. But what was then disclosed is sufficiently interesting.



The SPHINX when its FRONT was EXCAVATED, to show the TEMPLE and piled OBELISK between its PAWS.

A very striking feature, to my mind, is the square vertical forefront of the statue, where, instead of the expected well-developed chest and fore-shoulders of the lion's body, we find the *unimpressive, inartistic, and detractive flat vertical frontage*, although the rounded

expansive breast and limbs would have been so much more becoming to the well-known Egyptian style of Architecture. We know that those sculptors usually gave full effect to the rounded limbs and body, and as they so eminently succeeded with the portrayal of the face, it is certain that they were well able to outline the chest, etc. Besides, the dead-end and unlifelike breast, as seen through the Avenue of Sphinxes, by which it was approached from below, would be derogatory to the deification of the statue, as represented to the approaching worshippers. Therefore, we may conclude that some special purpose was served by that flat frontage.

That, I believe, was intended to solve the first difficulty of would-be Time-solvers, whose inevitable first step was to find **the meridian-line,** which this flat front so distinctly represented by its direct North and South direction, seeing that it is at right angles to the original direct East position of the statue.

The observer, standing at the right-hand foot of this wall-like rock, could daily sight upwards along its line the mid-day point of the Sun as the acknowledged central point of time.

From the same standpoint, the rise and fall of the Sun's elevations during the Seasons could be watched, and the approximate length of the Year—probably within a few days—could be found. *Very possibly the first twelve months' Year of* 354 *days (twelve lunations) was first definitely fixed upon by such Sphinx meridian observations.*

Six-Tier Original Obelisk.

The next distinctive indication I take to prove the purpose of the Sphinx is the six-tier Obelisk, rising from the Temple at the foot, right up the centre of the statue's front view to the region of the heart, as the basis of life.

Like the six tiers of Indian Sun-Stones, Stonehenge, and the early Pyramids at Sakkarah, etc., these six stones, piled up pointedly, suggest the six months or lunations during which the Sun rises from the Winter to the Summer Solstice, and then descends by the like gradations; for men's simplest and most obvious means of recording these elevations was by taking observations at times fixed by the recurring "full moons" or "new moons," which furnished their only Time-means of comparing approximately equal periods. The Moon periods were very unreliable as we know, and would prove very misleading.

By noting the shadows cast by that pile upon the wall-like frontage of the Sphinx, the idea of designing

Obelisks

would probably arise, and as they did not know the use of cement or mortar, they had later to resort to solid blocks to secure verticality. Thus that pile may embody the first conception of the Obelisk attempt to trace the full cycle of the Seasons.

at the bottom of the front view seem, by formerly pointing due East, to be peculiarly adapted by their shadows to trace the variations of the Sun-rise points, as the early gleams shone direct from the East down the little valley through which the Avenue of Small Sphinxes led to the great terminal Sphinx.—These vertical Temple walls seem so placed that the deviations from the Equinoxial Sun-rise points during the rest of the Year would cast *Sun-rise shadows* of increasing proportionate length over the South sides of the walls during the Summer, and corresponding North-side shadows during the Winter, as shown by the shadow from the wall on the left of the illustration.

Months indicated by Quarter Circles.

The other indication, which is barely traceable on the small scale to which this booklet is confined, lies in *the peculiar quadrant-like masonry* exposed to the left of the Temple area, where the number of these quarter circles, arched to the solid rock, though partly lost to view in the left corner, *seem to correspond with the lunations (months) in the Year*, as the foundation of the whole design.

The Sphinx probably led to Pyramid Methods of Research.

The central point of the whole picture is the *six-tier Obelisk*, which, as the forenoon Sun always shone from the left, would cast from its apex a downward sloping shadow upon the lower front to the right of the picture, which shadow would distinctly suggest the pyramid slope, by successively presenting to full view half the vertical sections of every possible slope of pyramid.

From that constantly moving series of shadows, so impressively portrayed each forenoon during their Sun-rise worship, it is quite conceivable that the first ideas were obtained towards definite pyramid construction as a better means of Solar research to trace out the Year, as that style of construction formed their only means of reaching the requisite height to allow of the daily shadows being sufficiently separated for complete record and study.

Tracing out by that trend of reasoning, we can see at a glance that as the face was due East, the vertical line of the wig-block, cut off sheer by the ears, would be due North and South, thus acting as a gnomon, casting the afternoon dial shadows on the right cheek. That would be sure to have been ultimately noted by the Priests (also possibly Chaldæan, Greek, or other visitors), and I think it is extremely probable that from thence arose the later idea that Time might be gauged on a much smaller scale by a due North ridge sloping to the South, and that thus the Sun-dial was derived.

That, however, would be a subsequent use, and not the original purpose of the Sphinx, which more probably was designed to search out the gradations of the Seasonal points by the

daily directions of the rising Sun, as they varied when viewed from some fixed point of vantage (probably the specially wide-set platform on the rear portion of its body) due West directly behind the Sphinx, when they could be graded by the outline of the head and fixed by terminal sightings upon the serrated Mokattam Hills some ten miles distant, beyond the Nile Valley.

The so-called TEMPLE of the SPHINX below the SPHINX and GREAT PYRAMID.

The excavations South-East of the Sphinx locate the Temple Recess (behind the standing Arab) of which the shadow-photograph, on page 176, was taken by the late Astronomer Royal for Scotland (Professor Piazzi Smyth), who believed with fair reason that the great granite vault was the Tomb of King Shafre, whom the Greeks called Cheops, who built the Great Pyramid.

The fact that the Ancient Egyptians did thus observe the heavenly bodies is established by the graphic representation, on page 112, of that Sphinx-like figure above which the π signs mark the positions of certain fixed stars at definite times, as proved by the hieroglyphic description which accompanies it.

The annual Inundation was the controlling factor in Egyptian national life, and as it roughly accorded with the Sun's greatest Elevation at Mid-Summer, that Solstice would in Pre-Pyramid Times for many centuries dominate the attention of the year-finding Sphinx observers, who would thus never suspect the superior advantages of the Equinox, especially as the Sphinx was so placed, that the low-lying land near the Nile which passed to the East, obviated the otherwise need for Equinoxial Amplitude stakes, which, if erected, would have been too low to view.

The observance of the Summer and Winter Solstice Amplitudes probably enabled those early Egyptians to face the Sphinx to the East, as their best means of defining the *Meridian Line* by the Sphinx's straight front before the fixity of the Polar Star was found out. For we should remember that long ages would pass before that was discovered, as in Egypt the Latitude is so low that the two Stars (which are still called "the Pointers," from being used to find the Polar Star) passed part of their apparent daily and yearly cycle below the horizon, and could not therefore then be seen, to direct attention to the apparent fixity of the Polar Star.

I thus suggest that the Sphinx was long anterior to the Pyramids, and probably gave rise to the Pyramid line of Sun research for further developing the Calendar.

The Sphinx, throughout the Egyptian hieroglyphics, typifies the union of physical power with intellect and wisdom, manifesting the superiority of the latter in the well-developed human head dominating the strong body of the lioness, combined in the statue.

The greatest physical force apparent to men was undoubtedly presented by the Sun, whilst intellect and wisdom were most evident in the ruling kings, who placed the highest governing value on Calendar knowledge.—What wonder, therefore, that this, their first great instrument for Sun Observation, should be designed as emblematic of those great powers for good, thousands of years before writing began, in times when the great mass of the people could only be made to understand by emblematic teaching?

The worship of "Ra," the physical Sun, appears at the outset to have been universal throughout Egypt. The origin of the Bible title, Pharaoh, given to the Egyptian Kings, is distinctly that of the Egyptian name for the Sun, from which the Kings claimed direct power.

Hence this Sun Observatory, as I believe the Sphinx to have been, was necessarily regarded in a national sense as a "gathering ground," or Temple, where the Sun publicly transmitted direct power to the Egyptian Rulers as pictured by the Egyptian Sculpture on page 13.

The Sphinx may thus be conceded to belong to Pre-Pyramid times. The rays from the nape of its neck radiating to the sunrise clearly indicate that purpose, and its position facing the sunrise points in the East so emphatically confirms that view (which had been forced upon me by the long series of experiments made whilst elucidating *Jacob's Sunrise Observatory* for page 154) that it

appears absolutely certain that the Pre-Pyramid Egyptians must, like Jacob, have been forced to centre their observations upon the Equinoxial Sunrise; therefore it seems evident that the pyramid builders must have aimed at sloping their pyramids to the Equinoxial elevation of the Sun; indeed, my long experiments with pyramid shadows proved to me in the most positive manner that the Equinoxial slope was vital to the great national observatory purposes for which those determined Egyptians so nobly toiled to build the mightiest and most useful work humanity has ever accomplished.

The very small difference of 1′ 57″ between the 5′ 40″ W. orientation of the 2nd Pyramid and the Great Pyramid's 3′ 43″ W. of N. seems to indicate the change of Polar location or Latitude between the respective foundations of these two pyramids, the exact dates of which, unfortunately, we do not yet know.

The much greater orientation difference of 4° 35′ E. from the true North shown by the older and more primitive Step-Pyramid at Sakkarah when compared with the Great Pyramid's—0° 3′ 43″ W. of N., evidences that change in the location of the Polar Axis which appears to have brought about the change in Latitude as previously explained.

This seems still further supported by the greater orientation change of the SPHINX, which though it now faces some 20° N. of E., must originally have faced due East, as its evident purpose was to LOCATE the SEASONS by that primitive pre-pyramid Amplitude method of "Sun-rise" observations, the essential basis of which was the due East line of Sunrise at the Equinox as detailed under Jacob's discovery of the "Israelitish 6 months year."

That 20° deflection from the original orientation is taken from the largest plan I could find in those splendid records published by the Great Napoleon's French Scientific Expedition of 1800, and as I have not been able to find a better record that will suffice for the present, as I do not intend to be drawn into elaborate and interminable discussions for which it will be impossible to find time in view of the far more important Almanac Reform work I have in hand.

Some readers may incline to the idea that the 20° difference indicates the Sphinx as a Solstitial Observatory, but in view of my experimentally-proved impracticability of finding the Year's length by Solstice Sightings and the far easier and surer Equinoxial method with which thoughtful men must then have been impressed, I am satisfied that the true East (Equinoxial) direction would be regarded by them as essential.

That being so, it seems evident that when the most ancient Sphinx Observatory was established, the North Pole must have been located about the East of Greenland when the Sphinx site was probably located about

the comparative Latitude and Longitude now enjoyed by Persia, as the application of the following diagram to a freely moving sphere may indicate :—

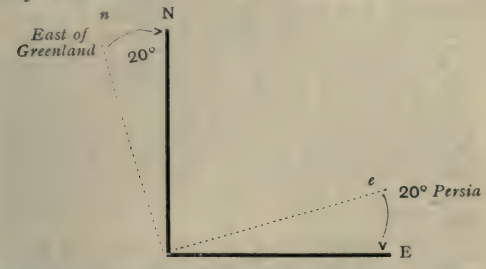


Diagram accounting for the 20° deflection of the SPHINX from the true East by the 20° change of Polar Location.

Here the *full-lined* right-angle N E denotes the present North Pole and Eastern direction at the Sphinx, whilst the *broken-lined* right-angle *n e* registers by *e* the then East original direction of the Sphinx, from which, at the corresponding right-angle 20° West of the Pole, may be found the *n* position of the North Pole, near Greenland, when the Sphinx was founded.

Reference to the "Map of Glaciated Areas," on page 214, may enable readers to understand that such a solution appears to accord with scientific investigation, for Professor Geo. Fredk. Wright's Geological investigations at Niagara, per page 233, prove that only about 10,000 years have elapsed since the Glacial Ice left that neighbourhood. As I have submitted reasons for believing that such Glacial Ice then marked the fringe of the Arctic Circle, it seems reasonable to conclude that the 23½° from Niagara to between Greenland and Iceland there marked the location of the North Pole, which was then being much more rapidly forced Northwards by the growing force of the warm Gulf Stream thawing into the Polar Ice.

Thus it seems probable that at the time the first Sphinx Observatory was originated the North Pole was drifting North of Iceland, and therefore the deflection of the Sphinx from the present true East may be regarded as further evidence of that most potential force of Changing Latitude which results from Polar Progression.

To many readers who do not know the undeniable evidences of Geology and Anthropology which prove the existence of men during the Tertiary, etc., Periods, probably over 20,000 years ago, it may at first seem difficult to believe that the Sphinx could date back to such an approximate 10,000 years' age as its 20° deflection from the present East implies.

To aid that belief and establish the fact that great changes of climate have been experienced in Egypt since its occupation by men, I may quote the following: -

Professor Maspero, on page 4 of his "Dawn of Civilization," refers to the conclusive evidence that Egypt has "been dried up,

hardened and gradually raised," and that Geologists from the 3,000 years' measure of the Nile's deposits, averaging 4 inches per century, believe that the Nile must have been forming its Delta during periods variously estimated as from 20,000 to 74,000 years.

Egyptologists can trace back Egyptian Civilization to about 7,000 B.C., or say 9,000 years ago, by means of pottery and implements excavated. Before that, Nomadic and Palæolithic men existed in Egypt during the preceding thousands of years, as we read in the *Encyclopædia Britannica*, Vol. XXVII., page 720-a -

"The earliest stage of man known in Egypt "is the Palæolithic; this was contemporary "with a rainy climate, which enabled at least "some vegetation to grow on the high desert, "for the great bulk of the worked flints are "found 500-1,500 feet above the Nile, on a "table-land which is now entirely desert. "Water-worn palæoliths are found in the beds "of the stream courses now entirely dried up, "and flaked flints of a rather later style occur "in the deep beds of Nile gravels, which are "20 or 30 feet above the highest level of the "present river."

Such irrefutable evidences are so manifest over Egypt that our greatest thinkers and searchers after truth are bound to accept the proven facts of great Climatic Changes and the existence not only of civilized men 9,000 years ago, but also of pre-historic men probably tens of thousands of years before.

When we think of the extremely slow rate of Human Evolution during Pre-historic Times, when everyone had to struggle for existence in almost constant alarm from his fellows and wild ferocious beasts, we may realize that many thousands of years elapsed before regular nomadic life was possible, and that nomadic men would probably range through thousands of years before they learnt to sow seeds and require such Seasonal guidance as could most easily be discerned by observing the Sun-rise directions from such a natural observatory site as the Sphinx.

Until then, settled life would be impracticable, and even then the conflicts with neighbouring tribes over hunting grounds and incursions upon primitive sowing grounds (when the difficulty of obtaining food and watching their enemies occupied most of their time) would long retard the development of primitive civilization to that simple stage which appears to have been attained when the Sphinx was founded as an "Amplitude Observatory."

But when we rationally consider the vast difference between that simple observatory and the stupendous Great Pyramid with its 6,000,000 tons of hewn stone so carefully constructed on mathematical principles, it appears evident that many thousands of years must have elapsed before the highly-developed civilization of Pyramid times could have been matured.

We should remember that the earlier struggles of civilization would require far

longer periods for their evolution than we can possibly realize in our age of such rapid progress.

They lacked machinery, means of transport, printing, writing and other almost innumerable inventions of subsequent civilizations.

Moreover they were in such a very marked degree predisposed to adhere to the tried methods of their ancestors, that we cannot realize how rarely it would be possible for them to take even feeble steps towards advancement.—Yet we are impressed with the fact that great Races, such as the Chinese, were highly developed 3,000 years ago, and then succumbed to that natural conservatism which has kept their civilization almost stagnant during the last 3,000 years.

Therefore we have reasonable evidence for believing that the primitive Sphinx civilization existed many thousands of years before the Pyramids were built, and we may fairly consider the possibility of the Sphinx having existed in the rarified climate of Egypt since the Polar Axis of the Earth was East of Greenland, as the "Amplitude" of the Sphinx appears to indicate.

Readers may naturally ask why is it that the ancient Sphinx shows a deflection of 20° and the Great Pyramid only 1′ 57″ from the compass points? My answer is twofold.

In the first place the Sphinx appears to have been founded about the time that the Polar Progression began its rapid course off the East coast of Greenland. Glacial Geology so markedly indicates that by the rapid withdrawal of the Glacial Ice in both America and Europe, as the Gulf Stream quickly attained its maximum rolling force by thawing inroads into the Polar Ice within the Arctic Circle, which then extended 20° lower (South) down the Atlantic, and on the Siberian side 20° further North, *i.e.*, nearer the present Polar location from the Asiatic side. The much greater speed of Changing Latitude during that period before the Pyramid was built would develop a far greater deflection of the Sphinx's "Amplitude" than in subsequent periods when the rolling force became weaker as the Gulf Stream got further from its source and became spread over a much wider area in the present Arctic Seas.

The second part of my answer hinges upon the apparent fact that when the Great Pyramid was founded, the North Pole was drifting across the Present Cairo Meridian about 7·1° South of the Present Polar Position, as manifest from the 7·1° meridian deflection of the Pyramid's Slope, which is the only register capable of displaying that Change of Latitude by comparing the Present Altitude of the Equinoxial Sun with the Pyramid's Slope.

The Great Pyramid would not have shewn any appreciable "Amplitude" deflection if the North Pole had been located at either Constantinople, Keiff, St. Petersburg, the North Cape, King Charles Island (East of Spitzbergen), or any other point on the present Cairo Meridian at the time the Pyramid was founded.—Indeed, if five successive pyramids

had been founded near Cairo at dates 1,000 years apart, and the Polar course instead of taking its past erratic current-driven direction, had spirally curved mathematically across all the Meridians during each 1,000 years, crossing the Present Cairo Meridian at the present 40°, 50°, 60°, 70° and 80° North Latitude; precisely when those assumed pyramids were built, no variation in "Amplitude" would have been apparent *when* observations were only taken whilst the Pole was on the Present Cairo Meridian. – The only difference would have been that each of those successive pyramids would have been sloped 10° lower than its predecessor, – yet all would in their "Amplitude" be true to the N., S., E. and W. points of the compass.

But I fully admit that if the Great Pyramid had been built when the Pole was crossing the present Iceland Meridian (where its curved course is shown North of Iceland on page 214) the "Amplitude of the Great Pyramid would have shown 20° to the North of East, as the present Equinoxial Sun-rise does at the Sphinx. I also concede that if the Pole had been located East of the Present Cairo Meridian, say at Nova Zemlya, when the Sphinx was first designed as an Observatory, or the Great Pyramid was founded, they would respectively now have shown a corresponding deflection of their "Amplitudes" to the South of the present East point.

The fact that the most ancient pyramids at Medum and Sakkarah have a present deflection of 5° to 6°, proves to my mind not only that the Polar location has progressed Eastwards about 6°, but also that the speed of that progression was very much greater in early Pyramid times than now.

Therefore I submit that the present true Orientation of the Great Pyramid merely proves that it was built whilst the Pole was crossing where the Cairo Meridian now registers, 7·1° below the Present Polar Location, and that those Astronomers and Scientists who have relied upon mere "Amplitude" evidence to disprove the widespread evidences of Changing Latitude, have not hitherto had the full bearing of this great question fully presented to their minds, or they would have more favourably considered the momentous factor of Polar Progression thus altering Latitude and thereby Climate, as evidenced by Glacial Geology and the more recent Astronomical evidences of the Sphinx, Pyramids, etc.

Those colossal works were then necessary to solve the vital problem of the Seasons and establish true "Almanac Times" for sowing seeds, to ensure food and maintain the very existence of the people against recurring famines previously caused by sowing at wrong times through ignorance of the Seasons we now have so usefully recorded in our Almanacs. The sowing, etc, times detailed on the Egyptian Calendar inside the end cover evidence the pre-eminent need of Almanac Records to secure plenty of both animal and vegetable food.

ADDENDA.

In any attempt to solve the ages and uses of Ancient British and other Druidical Observatories, such as Silbury Hill, the Mounds of Kokh and other pre-historic Mounds throughout the world, as well as the Vertical Stones and Circles such as those at Aldborough, Avebury, Stonehenge, and the many like erections found through Ancient Europe, Asia and America, we are perplexed by three almost insuperable difficulties :—

1.—Owing to their origin before Historic Records began, their true ages are unknown.

2.—Their past deflections in orientation through Changing Latitude, etc., at varying speeds, beyond the "Precession of the Equinoxes."

3.—The varying rate of surface accumulations from atmospheric deposits and soil-grown matter largely depending upon the foregoing unknown factors 1 and 2.

Taking Silbury Hill as a fair example, we know that since its foundation the soil and turf have accumulated to about 5 feet in thickness over the underlying levelled chalk floor, but we do not know the length of time taken to accumulate that 5 feet, as the rate of deposit varies in different Latitudes and under different conditions, *e.g.*, the prevailing winds across desert, leoss and sandy soils, accumulate deposits more rapidly on the leeward side, whilst the windward side is partly denuded. Valleys, Lake Beds, and Deltas silt up, as Silbury's Floor may have done.

I have already recorded some reasons for believing that the Latitude over the Earth has been gradually varied during the last few thousand years. We know that the Silbury floor area is still subject to floods, therefore we may never be able to locate the date when Silbury Hill, etc., were founded.

We may, however, form an approximate idea from the fact that the Roman Basalisca is still preserved with its Roman pavement *in situ* at Aldborough, Yorkshire (England).

That Roman pavement is now about two feet below the surrounding ground, and as it is evident that the Romans would have built it about the then ground level, we may reasonably believe that the rate of surface soil deposit has been about one foot in each 1,000 years.

That being so, we may fairly assume the age of Silbury Hill as about 4,000 or 5,000 years.

That uncertain period, with its unsettled rate of accumulation and the more uncertain factor of Changing Latitude, preclude the possibility of anyone deriving full data for absolutely settling the complexities involved in the Archæological Study of Silbury Hill ; therefore, for the sake of that simplicity which may enable readers to understand the following suggestions as to the great original Almanac purpose of Silbury Hill, I have to assume that the extra depth of five feet down the slope of the Hill and over the levelled Observatory Floor are equated by the Change of Latitude, etc. More than that would require adjustment in the height of the surmounted Sighting Staff, and would be too complicated to be dealt with in this plain effort to trace the pre-historic methods used in Britain during the Evolution of the Almanac.

The speck on the hill top is a man standing upon a chair, so that readers may thereby gauge the huge size of this artificial mound, which is of greater importance and antiquity than Stonehenge.

North. The broken patches of white indicate where the mound has been excavated by the Archæological Societies. South.

SILBURY HILL (Wiltshire) from the WEST, showing levelled ground on W., N. and E. sides, and the natural high ground to the SOUTH which was utilized by the Druids to save useless labour. Height, 130 ft. Top, 104 ft. Circumference, 1,633 ft. Area, 5 Acres. Weight, 1,100,000 tons.

"SILBURY HILL," as below, may be regarded as typical of the many similar hitherto unexplained OBSERVATORY MOUNDS found across Europe, Northern Asia and America. "The largest Peruvian Mound is 108 feet high, and 75 feet across its top." *Encyclopædia Britannica, Vol. II., p. 425-b.*

Since most of the foregoing was stereotyped, remarkably conclusive evidence in support of my theory has been quite unexpectedly adduced by Dr. Eddowes, of London, who, as reported in the newspapers, read a paper on "Stonehenge," before the British Association meeting at Dover, in 1899, in which he stated—

> "That the grooved stone (which is the best selected, worked, and preserved stone in the whole ruin, but has never hitherto received the attention it deserved) was used for supporting a pole in a definite and permanent manner, and that the signs of wear at the mouth of the groove, together with the two worn horizontal hollows or waists and the dimples on the convex back of the stone, indicate not only *where*, but *how* this pole was fixed. Such a pole would form the pointer of a sun-dial for daily observation, or—what was more important—an indicator of the time of year by the length of its shadow. The levelled avenue (along which the sun's shadow would fall about 3 p.m.), and the flat 'slaughter-stone,' with its arrow-head marking, seemed to support this view."

"Dr. Sebastian Evans, who presided, thought Dr. Eddowes thus proved 'that Stonehenge had been used for the purpose of an Observatory.'"

STONEHENGE "GROOVED STONE."
(From Photo kindly supplied by Dr. Eddowes.)
The cylinders in the groove represent the pole, and the white bandages the hoops or cords which would hold it.—M.B.C.

This was probably the most recent stone erected, and suggests the connecting link between "Stonehenge" and the adjacent "Silbury Hill," from which I believe the Druids came to erect the "Stonehenge" stones and poles.

On the original sketch for page 38 I had outlined for London's Latitude a section of its resulting Equinoxial Pyramid, which was then denoted **L P** (London Pyramid) where the same section is now under-marked **S H** (Silbury Hill). Whilst my drawing was at the engraver's in London, the thought arose, could any such artificial mound be found at or near that Latitude?—Noting that Silbury Hill was at practically the same Latitude, I next drew it in section from the dimensions given on page 11 of "Old England" (Chas. Knight & Co., London, 1845), as already quoted at page 36, but as those details were thereby geometrically proved to be inaccurate (because a 316 ft. slope demanded a wider bottom circumference or a narrower top circumference for that height of cone), I decided to go down to Salisbury Plain and measure the hill carefully, and check it both by levels and theodolite.

Still, the section derived seemed to my eye so very near my recollection of the one previously sent to London, that I forthwith wrote the engravers (Messrs. J. A. Marshall & Co.) to alter the letters from **L P** to **S H**, for, as the Latitude was the same, I felt certain, from experimental adjustments, that Silbury Hill's slope, when adjusted for denudation, would prove its year-finding purpose.

Shortly afterwards, I reached Silbury Hill, and was at first puzzled on finding that its slope was built to an angle of 30°, but still, as I expected, the height was much greater than 107 ft., and the circular top was not so large as 120 ft. diameter, but only 104 ft.

On returning to the nearest station, Marlborough, I was fortunate in finding that enthusiastic and able antiquary, Mr. J. W. Brooke, the surveyor for Marlborough and district, who kindly informed me that the Government's geological surveyors had only recently surveyed the whole ground, and gave me the latest verified section of the hill, which is reproduced overleaf just as he very thoughtfully prepared it for me. Hence this section of Silbury Hill is entirely impartial.

Mr. Brooke freely showed me his copy of Mr. A. C. Smith's "British and Roman Antiquities of North Wilts," from which it was at once made clear that two figures had been transposed, and so misprinted in the "Old England" recorded height of 107 ft. instead of the 170 ft., as clearly taken from Sir Richard Hoare's measures, with which all the other dimensions reproduced on page 36 agreed.

I was very thankful to so unexpectedly find that the large set of instruments (brought all the way from York) could be dispensed with, especially as Mr. Brooke's section of the hill afforded perfectly impartial testimony, and authenticated the dimensions, for then no one could urge that they had been deflected or strained to suit my theory.

The following heavy outline and figured dimensions of Silbury Hill are exact reproductions in size, slope, dimensions, etc., of the section Mr. Brooke furnished to me.

Outside those I have scaled the dotted outlines of Sun-shadows, etc.—*not by fancy,* but by the strict application of mathematical lines aided by my experience of Sun-shadows, as derived during last Summer from cone, pyramid, and obelisk shadows, as already explained in the pyramid section, which it is hoped has made clear the absolute necessity of extending the longest possible pointed mid-day shadows, or sighting lines, to differentiate the Solstice an Equinoxial points, before the length of the Solar Year could be found.

When examining all the local conditions from the top of the hill, I became fully convinced of its year-finding purpose, because it was evident that all the essential conditions of my theory (Seasonal graded slope, level north floor area, etc.) had been complied with, at an expenditure of time and labour which implied the united efforts of a pre-historic race.—The labour involved was so enormous that it could only have been induced for some great purpose of national utility. Moreover, the whole surrounding area pointed conclusively to the hill having been erected as a Solar observatory, to thereby determine the Seasons and Year's length.—I could not accept the Antiquaries' idea of an *artificial* burial mound covering over 5 acres and containing about 1,103,797 tons being so senselessly erected for any pre-historic king, seeing that even with all the engineering resources developed to their present high standard during the 2,000 odd years which have since elapsed, we could not pile up such a mound for less than one shilling per ton, or a present total cost of over £55,190.

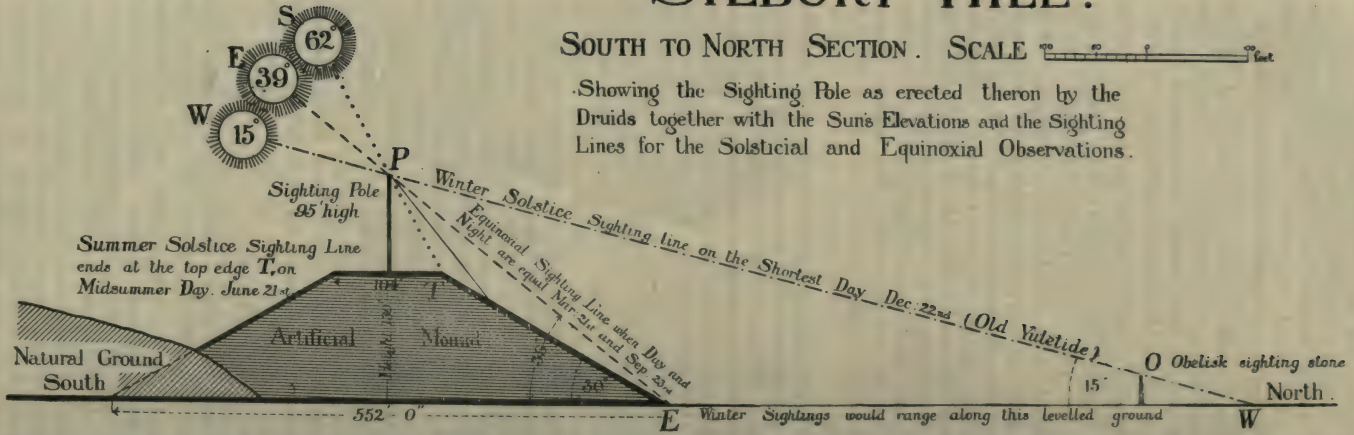
When this result was worked out. I was greatly comforted to know that this, the greatest and most sacred relic of the past in our "Island Home," was in the safe keeping of our noble-minded countryman, Sir John Lubbock, now Lord Avebury.

When purchasing Silbury Hill, Sir John Lubbock could not have known of its Year and Season-finding purpose of construction, now for the first time declared. He was not actuated by "greed of gold," nor yet the millions of tons of chalk underneath, but simply a desire to shield this relic of the Ancient Britons, together with the adjoining Druidical Circle at Avebury, which he has also

SILBURY HILL.

SOUTH TO NORTH SECTION. SCALE

Showing the Sighting Pole as erected theron by the Druids together with the Suns Elevations and the Sighting Lines for the Solstucial and Equinoxial Observations.



The heavy outline of the Hill shows the section and measurements, kindly furnished to me by J. W. Brooke, Esq., the eminent Antiquary and Surveyor, of Marlborough.

MERIDIAN SECTION–SOUTH to NORTH–of SILBURY HILL, showing how it appears to have been used by the DRUIDS about 2,000 B.C.

bought, to preserve them to the nation from the vandalism of cheap builders as well as those curio-hunting and initial-carving sightseers, whose names will never be worth remembering.

The need for such protection is apparent when we find that some of the most valuable huge stones of the Avebury Circle were broken up to build part of the wall of Avebury Churchyard.

Beyond the 3 to 1 ratio of slope to height, the before-mentioned figures convey little to non-mathematical minds; but the section of the hill distinctly displays the characteristic shape requisite to gauge the Seasonal course of the Sun.

All the old measures were excessive, as proved by the more accurate measurements of recent times.—Such exaggerated height of 170 ft., instead of 130 ft., any surveyor would expect from the imperfect measuring instruments of Sir Richard Hoare's time, because—

(1st) The process of denudation during 2,000 odd years has developed ring-like layers round the hill-slope, which thus strikes the eye as being much steeper than it really is.

(2nd) This deceptive slope would obviously incline the vertical measuring rods to the top of the hill, whilst the levelling instrument would be affected by the like tendency.

All these unintentional defects unduly raised the apparent height, which seemed so curiously confirmed to the eye that I expected to find the Equinoxial slope of 39°, as Dr. Stukeley, the earliest authority, said the slope was 40°.

Certainly the slope looks more like 50° than the 30° it really is. I have never seen anything else so insidiously deceptive and so difficult to measure by "levelling." Still, of course, the modern "theodolite" gives true trigonometrical measures.

Further, by applying a transparent protractor's diameter to either side of the hill's base-line shown on the following photo plates, the reader can absolutely verify the slope of 30° by the 30° radiator line, and also clearly see how the wastage of denudation has worn the top of the slopes and drifted its material upon the slightly increased slopes below, as indicated by the shading along the section's slopes.

The wastage is thus seen to have been exceedingly small when the hill's vast age is borne in mind. This is explained by the wonderful weather-resisting qualities of Chalk —than which no better material could be found, for this hill has stood practically intact for about 4,000 years, whereas sand, gravel, soil, or other easily piled material would have wasted or "weathered" away the shape of this permanent observatory they were erecting.

The presence of Chalk seems one reason which would lead the Druids to fix upon Silbury when it was obvious no natural hill could be found shaped to suit their purpose: because at any given latitude the elevation of the Sun at the Equinoxial and Solstice points gives relatively fixed angles, which of necessity regulated the slope of their observatory hill, when the height of their sighting staff placed at the top of their hill was clearly limited to the highest height obtainable by splicing or lashing a lighter straight pole to the top of the tallest straight tree they could fix on the mound's top.—For we may fairly concede that the Britons who could convey the huge Stonehenge Stones such long distances and erect them, were capable of very firmly lashing large poles together and staying them erect upon the levelled platform prepared on the hill top.

In this connection, it is significant that *a piece of cord, as made by the Ancient Britons*, was found right down the centre shaft which the Duke of Northumberland sunk from the top of the hill in 1777, to test whether it was a sepulchral mound. *This cord would probably be part of the lashing used to maintain a guide-pole in the centre whilst the hill was being constructed.* No trace of a tomb was found, and the hill was proved to consist of Chalk, *with the important exception that the original turf* from the previously surrounding natural sloping ground *was embedded deep down in the centre*, in a partially fossilized form, as though it had been rolled down the crater-like mound which would naturally result during the simple process of piling the hill from the adjacent chalk.

In 1849, the Archæological Institute of Great Britain tunnelled horizontally along the surface of the natural ground on the south side, which was thus proved to have been partially utilized by the erectors, as all below was the original solid chalk, but above and beyond only chalk rubble with occasional turf sods were found, although circular galleries and side-chambers were cut to complete the test.

Since then, other borings on the west side failed to trace any sepulchre, but all confirmed the now indisputable fact of the *artificial* construction of this wonderful chalk hill of over 1,100,000 tons, which the Britons had undoubtedly erected many centuries before Roman times, as proved by the fact that quantities of "ancient flint implements" have been found upon the surrounding original artificially levelled chalk floor, *under* about 5 ft. of mud and clay sediment and atmospheric dust subsequently accumulated.

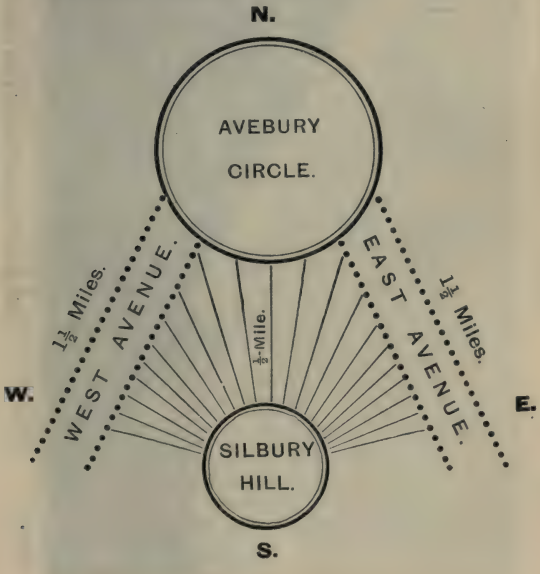
The next point marking its antiquity was that the ancient Roman road (see photo) between Marlborough and Bath makes direct for Silbury Hill, to avoid disturbing which it deviates to the south. contrary to the Roman

custom of constructing straight roads, notwithstanding the fact that a straight road (taking off a little of the hill's south slope) would have saved the Romans some extra labour. Hence we may conclude that at the beginning of the Christian era this already old mound was still looked upon as a sacred or Druidical hill.

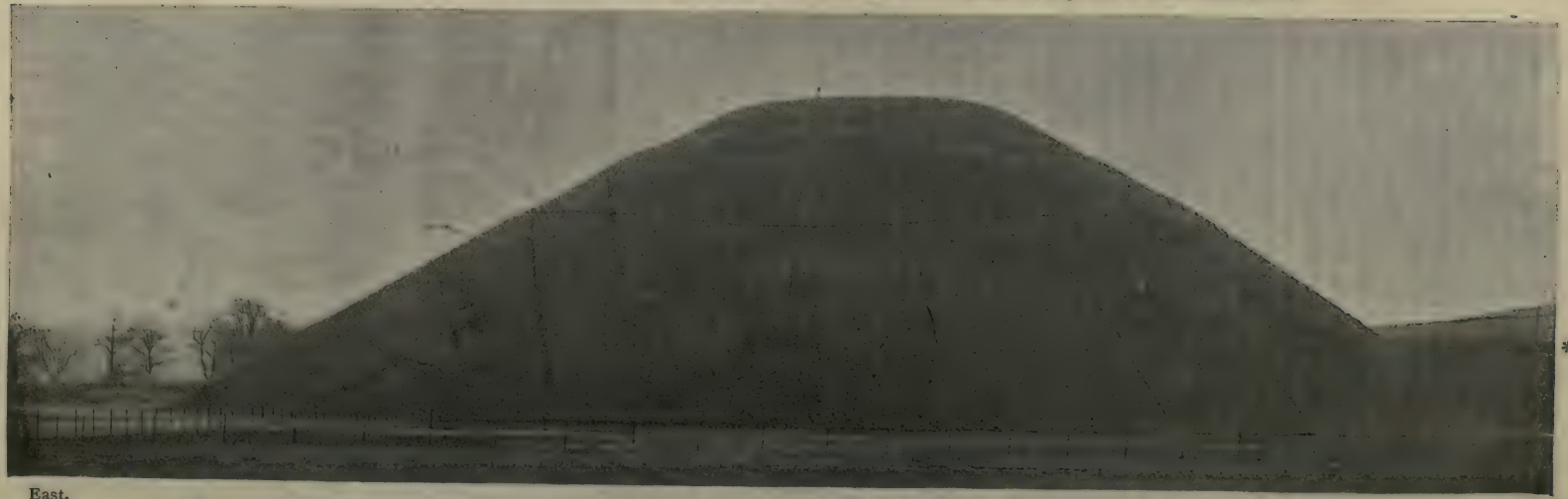
The view from the "Silbury Hill" top affords convincing evidence that the present ground level footing the north, east, and west sides was purposely and carefully levelled when the hill was made from the undulating chalk formations which formerly covered it. And although there is no other extent of level ground within a radius of several miles, yet this artificially levelled plain extends North of the hill in triangular shape directly up the "meridian line," with its apex pointing to Avebury Church, for which some specially central or sacred spot would originally be chosen (it being due West of the "Vallum" and "Great Druidical Circle").

The fact that the hill's South side was not trimmed down to the artificial ground-level of the other sides, but left at the natural level of the ground rising to the South, indirectly bears out this theory, because obviously, neither the *lower part* of the South slope nor its footing area could be of any use in gauging the Sun's path (either by shadows or "sighting points"), therefore there was no need to waste labour in perfecting them.

The *upper* part of the South slope would be perfected as becoming to this great observatory, and also to help the observations of the morning and afternoon Sun, when "sighted" by the hill's slope or flagstaff, etc., from between the stones of the great neighbouring East and West Avenues, thus:—



The speck on the hill top is a man standing upon a chair, so that readers may thereby gauge the huge size of this artificial mound.



East. West.

SILBURY HILL from the NORTH, showing the Levelled Observatory Area on N., E. and W. sides.

* The thin Telegraph Pole to the right is along the Ancient Road which the Romans curved round this Sacred Hill.

Mid-way between these Avenues' South ends stands Silbury Hill, through which a straight line cuts off the South terminals of both Avenues. The area, South of the Hill, was well populated in ancient times, as proved by the extensive "middens," wells, etc., recently discovered by Mr. Brooke.

The direction of these *long* avenues, and their relative positions to Silbury Hill, indicate that the earlier Druids were led into paying *undue attention to the rising and setting Sun*, which loomed so much larger when near the horizon that it then seemed nearest the earth, —for it is highly improbable that the Ancients understood the laws of "Refraction," which magnify the Sun and Moon discs at low elevations.—(This is confirmed by the Eastern "Friar's Heel" stone at Stonehenge, over which at dawn on the Summer Solstice day, the rising Sun's rays pass direct to the Altar.)

Yet, the Silbury Hill's purposely levelled North space conclusively shows that the North meridian line became the ultimate field of observation, and as the interest centred more on that true line of research, the interest in the Avenue "Sun-sighting Stones" would wane, and with that their local value would disappear. In fact, when once the lengths of the lunation and Year were found, the purpose of the Silbury Observatory would be accomplished, and active interest in the preservation of its poles and sighting stones would diminish and ultimately cease.

It is reasonable to assume that the best and most perfect stones would first be taken for the earlier Avebury Observatory, and that when that was superseded by Stonehenge at a later time, the most useful of such stones being wanted at Stonehenge to observe the Stars (as well as the Sun and Moon), would most probably be transported there by the Druids from Avebury, which archæologists admit to be much older than Stonehenge where the dressed stones belong to a later and more skilled age. Further, they agree that the Stonehenge stones originally came from the "Sarsen stones" found in the "Grey Wethers Valley," two miles east of Avebury.

That transportation is most probable, because less labour would be involved, and the most perfect stones would be so readily selected for shaping as required. In that case, the main "Meridian Sighting-stone" (or stones) on the level area North of "Silbury Hill" would certainly be moved, and its original position be lost to us, for the flint implements already referred to as found 5 ft. below the present surface show that the groundwork of such stone has been obliterated over 2,000 years ago.

Even if the foundation bed of the Winter Solstice sighting stone could be found, its removal renders its identification impossible,

because any obtainable height of stone ranging, say, from 3 to 30 ft. above the floor level might have served if placed four times its height in distance from the "tip point" *(W.)*, for the "sighting line" *P.O.* *(O.* being the stone obelisk) from the top of the pole to the top of the stone would coincide with the Sun's rays when casting the shadow of the stone to the tip-point *(W.)*, which being necessarily marked upon a moveable log laid lengthwise on the meridian line would certainly make it very important that the "sighting stone" should be as high as possible.—Such a stone was all the more likely to be removed to the later Temple at Stonehenge.

Possibly excavations along the meridian might reveal some trace on the lower chalk floor; but as I had no authority to thus test. my only available means of search was an experimental diagram, made by adding to Mr. Brooke's section such data as could be derived from local inspection and experience.

The yard being the simplest and easiest unit of measure used by the Ancient Britons, and judging by experience that 300 yards from my standpoint (the top centre of the hill) would be about the best sighting distance, I looked up the North Meridian Line, and noted that the old roadway appeared to have been purposely deflected and kept clear of this 300 yards' level.

Bearing in mind the 100 stones of the Avebury "Great Circle," which with the 200 stones of the "Avenues" make 300, and the 30 circumference stones of the inner circles (which also applied to Stonehenge as evidencing the 30 days' month), and further, the trilithons and 3° differences referred to on page 9, the 300 yards' range seemed most probable, as all these seemed to hinge upon 3° for their significant figures.

Upon reaching home, I scaled out a 300 yards' level extension upon Mr. Brooke's plan, due North from the base centre of the hill, to get the Winter Solstice sighting point *(W.)*, from which a line drawn at the 15° angle of the Sun's Solstice Elevation (see dash and dot line *P.W.* upon the section) should strike the height of the "Sighting-staff or Pole" *(P.)* used above the hill top, when measured upon the vertical line I had purposely extended above the hill's centre. The height thus denoted scaled 105 ft., which appeared beyond the reach of any tree grown in Britain, as enquiries from postal telegraph engineers proved 85 ft. poles were the longest now used, and they came from Norway.

Those heights of 85 to 105 feet cover the *maximum range* of heights to which it was practicable for the Ancient Britons to reach.

My theory suggested that some fixed Winter Solstice "sighting stone" would be used by the Druids, but no evidence of such stone was known, so a *search seemed desirable, as the finding of such stone in the requisite position would raise my ideas from a highly probable theory to an established fact,* **because I could thereby further prove by Sun Elevations the height of the pole on the hill top, as used by the Druids, though to my mind the crossing point at 95 feet above the hill top of the Equinoxial line from the foot of the hill with the Summer Solstice line from the upper edge sufficiently proved the fact.**

My time was fully occupied, so it was desirable to avoid a second journey of over 500 miles to and from Silbury, if possible.

Accordingly, I wrote requesting Mr. Chivers, of Avebury (who was taking the photographs for me), to carefully examine the ground along the North meridian line, to see if any trace of a Sarsen stone could be found. He replied that there was no such stone.

I therefore wrote again, requesting that a more thorough search should be made at about 300 yards' distance up that line. He replied, December 23rd, 1899, that he "failed to find any such thing."

Yet again he was pressed to look more closely, with the result that on January 5th, 1900, he wrote me—"I saw one stone like you mentioned about that distance from the hill, *due North*, embedded in the earth. I do not know any purpose for the stone, as there is nothing there to require its use, as this stone only just shows itself level with the earth."

Before my request that it should be laid bare and photographed could be complied with, serious illness attacked Mr. Chivers, and necessitated my going to Silbury to take particulars, on 20th January, 1900.

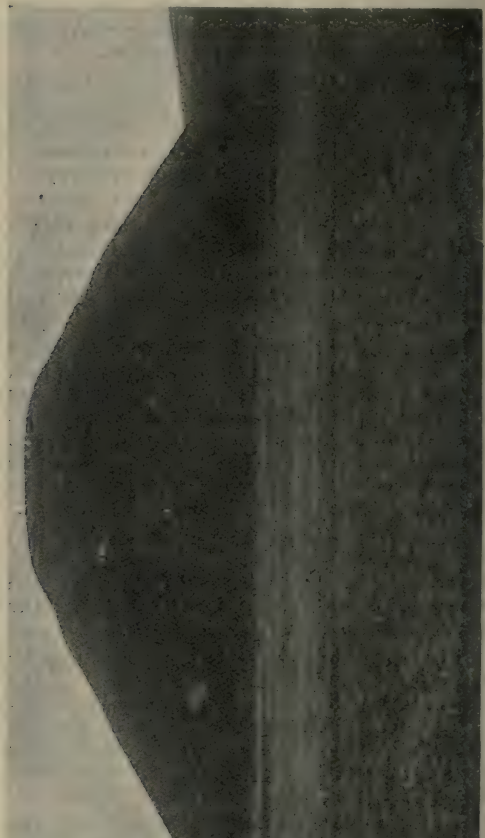
The Saturday evening twilight was gone by the time I reached Silbury Hill, but as the North Star was just visible I stepped Northwards from the North-base-centre of the hill, and at a distance of 319 yards stumbled across the stone, which was scarcely an inch above the thick grass.

Whilst going to Avebury village to get the consent of the tenant (Miss Kemm) and find two men and implements to dig round the stone, a thick fog came on, and although we had three lanterns it took over half-an-hour to find the stone, as the lantern light cast the shadow of the grass over the stone, which was very difficult to find again, as it could only be seen when we were right upon it.

The stone, when bared, appeared to weigh about 500 lbs., being about 2 ft. by 1 ft. 8 in., and had upon its under-side some crude sculptures of a fish, etc., which appeared clearly moulded upon the clay bed from which the stone was lifted and then replaced.

Two vertical groove marks on the stone might possibly have been used for upright poles to form the Winter Solstice sighting point, but the fragmentary size of this Sarsen stone, and the fact that it was found laid sideways, instead of vertical, lead me to think it was incomplete, and to doubt whether that was its original site.

As that will take some time to determine, and, possibly, lengthy experiments, with the consent of the owners of the properties we cannot satisfactorily determine the issues till later (the late owner having died last week), *though they seem to correspond so closely to what I had anticipated.*



SILBURY HILL, showing the first 150 yards length of the LEVELLED OBSERVATORY AREA up the NORTH MERIDIAN LINE, from the foot of the Slope to where the later cut bye-road crosses the levelled Area towards AVEBURY. The MOUND of KOKHON, on page 264, is very similar.

The "SARCEN STONE" was found near Avebury, in the levelled ground about 319 yards from the foot of Silbury Hill, as shown by the stone's top on the lower edge of the photograph preceding the Summation.

Mr. Brooke has kindly pointed out that probably the tallest straight fir-trees grown in Britain have their natural *habitat* on the Tertiary deposits at Ramsbury Bottoms, about 9 miles East of Silbury, where they now grow to about 100 ft. high. I may add that in the closer growths of the primeval forests the firs would grow straighter and to greater heights through the lower branches being smothered; meantime "in the struggle for the survival of the fittest," the growing tops would receive the extra growing energy and be forced higher to get light and air, so growing taller than at present.

The very thin top of any such tree would have to be cut off as being too slender to be "sighted" in the glare of the Sun from the ground level North meridian line. To ensure true records of the Sun's Elevations probably a ball or "sighting knob" made from a cored tree section-spiked through by the pole, would be fixed upon the top when cut down to a part sufficiently strong to bear it. In addition to that top reduction of, say 10ft., some 15 ft. of the lower trunk would have to be sunk in the truncated top of Silbury Hill to secure the verticality of the pole, hence it would not be reasonable to expect that they could reach any height over 100 ft. above the hill top, as splicing or lashing poles together to reach to greater heights would be impracticable in that exposed position, owing to the swaying of the poles in rough weather and the limited hill-top area restricting the use of props or "staying ropes" to support higher jointed erections.

Bearing in mind the $\frac{1}{2}^{\circ}$ apparent diameter of the Sun, and the probability that the top of the sighting-staff would not exceed six inches in diameter, we know that the shadow of that staff would vanish by the meeting of the outer rays of the Sun behind the North side of the pole at about 60 ft. distance down the shadow-line from the top of such staff; hence, unless some means was devised to widen the top of the erection, or fill up the apex with masonry, to complete the cone shape of Silbury Hill, we can only conclude that the Druids would have to resort to recording the Sun's gradations by *sighting* it through flint scales (to shield the eye) from the foot of its elevation-line when the Sun appeared disced on the top of the sighting-staff.

We have not the least trace of evidence that the hill's apex was ever crowned solid to project a readable shadow such as a high cone or pyramid would throw, for no foundations appear on the truncated top which appears purposely levelled to fix thereon the highest possible combination of poles.

The Druidical Stones at Aldborough (shown on page 10 of the pyramid section) prove conclusively to my mind that the Druids did resort to such combinations of poles to secure higher *sighting points* for Sun observation.

The large honeycombed and carefully drained holes on the tops of those stones for fixing higher poles thereon, with the series of grooved-socket-hollows deepening towards the top of the stones as distinctly cut into the upper parts of the sides, seem to clearly point to a number of lower poles being lashed together round the higher sighting-staffs thus held up, whilst all were held erect and weighted down by the solid stone-weights of about 30 tons each to withstand the strongest winds. It seems extraordinary that this solution should not have been found out by our great Antiquarians before now, as the antiquated idea that the grooves are "weather marks" caused by the rain, seems contrary to the real indications.

The fact that the grooves near the top of the Southern face of the central stone are very short, wide, and deep, appears convincing proof of pole use, because, *as the stone inclines a little to the South*, the Druids would naturally place stronger poles of support on that side, though less in number, whilst of course such supporting poles (grounded away from the base of the leaning stone) could only be socketed into the obelisk for a short lashing distance near the top, as had they been lashed nearly straight up that side they would have leaned Southwards, and so dragged the stone down instead of supporting it as was of necessity intended.

From these indications, and the fact of the piece of Ancient British cord being found in the deep central excavations of Silbury Hill (page 296), we may rest assured that the **Druids did use combinations of poles lashed together to "stay" or support the highest possible poles,** as splicing together tall trees was impracticable at that height, and though the erection of the largest single tree was easier and far more permanent and reliable, even that would become more difficult as the height increased. From these we see that pole heights beyond 100 ft. above the hill-top would be practically impossible, hence it is not likely that 95 ft. could be exceeded.

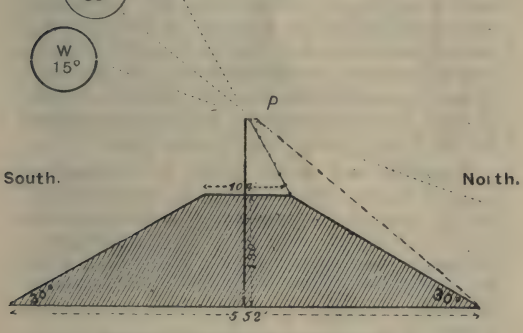
Though 100 ft. now seems about the tree limit, old people resident in the Ramsbury district speak rather doubtfully of having seen or heard of trees grown there to about 120 ft. high, which, less the 25 ft. top and bottom deductions before-mentioned, would give a sighting-staff of, say 95 ft.

All the probabilities point to the available range of pole height being between 85 and 105 ft., and though we know they had the strongest possible incentive to attain the greatest possible height, we have no reasonable ground to expect that even 100 ft. could be reached, hence it seems most highly probable that the mean of 95 ft. was the practical height attainable.

* Later I find that the last Maypole erected in London was 100 feet high. It stood till 1713 where the Strand Church now is, near Somerset House.

Curiosity led me to test the mean of these 85 and 105 ft. heights, so measuring 95 ft. on the vertical line above the hill's top, and inverting my protractor centred on the 95 ft. point (when governed by the vertical line as 90°), I scaled down the 39° line of the Sun's Equinoxial Elevation (see hit and miss line *P.E.*), when it cut the base-line exactly at the toe of the hill, somewhat to my surprise. That seemed singular, but no key to the peculiar 30° slope of the hill, again seen to be 9° from the Equinoxial slope originally expected from my pyramid experiments.

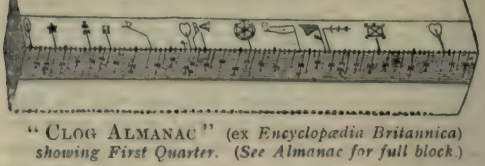
However, I was prompted to test the Summer Solstice line of 62°, and was most astonished to find that it cut the top edge of the hill's slope exactly at the level-edge of the truncated top,—thus indicating why the hill was cut off at that characteristic level, and giving a clue to the reason why truncated cones and pyramids were built, though until that moment they had appeared inexplicable to me.



Meridian Section of Silbury Hill.
The shaded part and dimensions show Mr. Brooke's Section half-size, as extended on page 294.

This remarkable fact displayed a higher knowledge on the part of the Druids than I had thought of, for this 30° slope of mound not only enabled them to sight the visible daily elevations between the Equinoxes and the Winter Solstice graded upon the level between *(E)* and *(W)*, but also, as the mid-day Sun rose from the Spring Equinoxial footing to its Mid-Summer Solstice height, it could be graded up the slope to its turning point *(T)* on the top North edge and down again to the Autumnal Equinox, as Autumn approached.

In that way, the Four Seasons of the Year could be clearly indicated and comparative records kept by "*notching*" the daily or monthly points upon logs laid up the North-Meridian-slope, as was done upon the old



"CLOG ALMANAC" (ex *Encyclopædia Britannica*) *showing First Quarter.* (*See Almanac for full block.*)

which were used over Northern Europe ages before printed Almanacs were dreamt of.

It is even possible that the idea of the "Clog Almanac" may have arisen at Silbury Hill, where the "ledge," about 20 feet from the top of the North slope, coincides with the May shadow or sighting point, between which and the Mid-Summer Solstice point (topping the slope) the gradations would be so fine as to necessitate cut log records for comparison with other years.

Four-sided log Almanac recorders (for 4 consecutive years) would be most easily compared, and when checked off with the preceding or following log-records taken from such a height, might, by deductive reasoning, even have raised the question of the extra day each 4 years (or ¼-day yearly), though centuries would be needed to absolutely prove the fractional day, because in the British cloudy climate clear observations could not be secured for 12, 8, or even 4 years in succession.

Probably not more than an average of records in *alternate years* could be relied upon at one point of observation, even if we concede that their climate was clear of the cumulative defects caused by the smoke, etc., of our time, for now the Winter Solstice observations hardly average one clear noon in three consecutive years.

The Winter Solstice could not be observed at either Silbury Hill nor the Aldborough "Devil's Arrows" in 1898 or 1899, neither was the Summer Solstice visible in 1898; so we may partially appreciate the difficulty of the Ancients, who would long for the cloudless sky, bright sunshine, and sharp shadows of such a land as Egypt—as I have often done when, after a long journey for the purpose, it was found that the overcast sky precluded observations being taken.

The Druidical *know'edge of the Year's length* would therefore be acquired in very slow and laborious stages, even though other points of observation on the Continent, etc., were also used where the sky might then be clear.

The Ancients' difficulty of preserving and comparing their observations was intensified by the shifting and uncertain Almanac they were working upon.

ANCIENT BRITISH CLOG ALMANACS.

These as Perpetual Almanacs notched on wood, were widely used over Northern Europe before the invention of printing, and remained the Almanacs of the people in the North of England until about 1686.

It is very remarkable that these old traditional Almanacs, cut on wood, so long continued without having marked thereon the dates of the month; for although in Leap-Year, Leap-Day caused the week-days after it to fall a day later, that could have been allowed for by reading the week-day names for March 1st and the following dates a day later without disturbing the monthly numbers, as was repeatedly done by users of these Almanacs.

From that significant absence of numbering their Almanac dates, despite the evident convenience which would have followed such numbering, I argue that these unnumbered Clog Almanacs originated in the old lunar Almanacs of the Druids, which are fully described in the Addenda under "Stonehenge" as being unnumbered, because of the impossibility of fitting the changing phases of the moon's 29·53 day period with the necessarily complete day dates of any Calendar. The cross-like signs to the left of the notches indicate the probability of this connection.

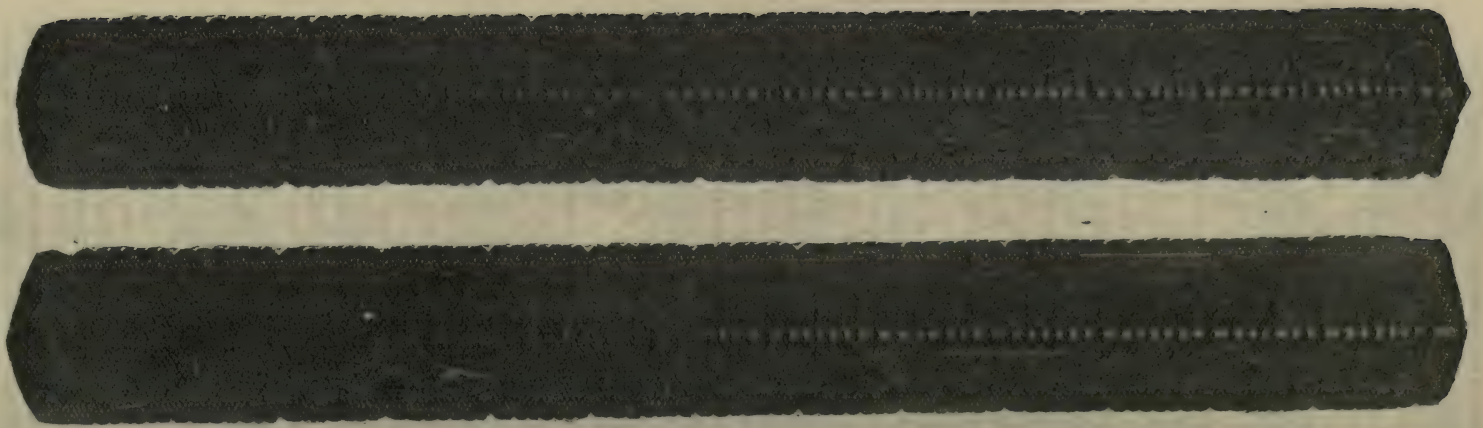
To the ancient people this Yearly changing of the New-Moon's date by the Eternal Creator would be sacredly regarded as almost precluding any attempt of man to permanently fix the dates of the days in successive Years: thus the fascinating habit of referring to sign marked instead of numbered Almanacs would become traditionally fixed and last through long ages, almost perpetuated by that glamour and mystery which always surrounded the Almanac, as the very embodiment of that secret, profoundly useful Year knowledge which had the greatest sway upon the minds of Primeval Men, through the sacred belief that it was communicated by God to the Priests or Rulers.

The four square-ended oblong blocks shown, represent the four quarters of the Year. These were each sub-divided into three months which had their first dates marked by an up-turned pipe-like cut to the right of the notch angle, whilst to the left by cross-like signs, the relative monthly positions of the moon's phases were indicated.

Sundays were marked by broader notches.

As the chief object was to show the Sundays and chief fixed Holiday Festivals in each Year (when of course both the week-end days and moon phases governing the Festivals varied), the user had to note the week-day upon which each New Year began, and the particular phase of the moon at the New Year, to enable him by brief mental addition or subtraction to name the week-days for the recurring dates of each Year and locate the Festivals.

The following photographs of two "Clog Almanacs" will convey a better idea of those once very useful articles, which were so prized in Ancient times that only the Chief Priests and Noblemen were initiated into their mystic signs. I shall be glad to hear from any reader who may have an old "Clog Almanac."



Old British four-sided perpetual "**CLOG ALMANACS**" as used by European, etc., nations before printed Almanacs became common. The Upper "Clog" shows the 2nd and 3rd sides of the like wood-log Almanac diagrammed on page 29 of the Almanac Section, the centre being the 3rd edge, the *left* and *right* edges representing the 2nd and 4th edges of the diagram. The lower "Clog" is an older variation, showing the 1st edge down its centre, beginning the Year with January 1st day "notch" at the top. The Axe for St. Paul's Day (January 25th), and Welsh Harp for "St. David's Day" (March 1st), etc., may be seen to the right. *The Runic dots and crosses down the left sides of each edge are very like those edging the pillars inside Maes-howe, as later shown.*

Obviously, the first attempts to find the Year's length would be directed to gauging the number of days between the turning points of the Sun when disced upon the top of the superposed "sighting-staff" at the Winter and Summer Solstices, half of the mean between which would naturally be expected to mark the Equinoxial points. The extent of the present ascertained variations of the inter-noon differences in the length of the "sighting-lines" at the Solstices (as proved upon a former page) could not be discerned until refined instruments were invented later, and as the Equinoxes thus appeared dependent upon the Solstices being first ascertained, we cannot doubt but that the latter absorbed the first attention of observers.

Further, the Summer Solstice point was incomparably more difficult to trace than the Winter one, which has so much lower elevations, giving vastly longer shadow or "sighting-line" records, hence we may expect that the Winter Solstice point would be taken as the first line of research, particularly as then the Sun is more on a level with the eye, which can then best bear that minimum glare of the Sun.

Bearing this in mind, I looked for the Dec. 21st and 22nd (Winter Solstice) noon Declinations in the *Nautical Almanac* for 1899, and found that they only varied 2″ (*i.e.*, 2″÷32′ 2″ (Sun's diameter) = ·00104, *or* $\frac{1}{961}$*st of the Sun's apparent diameter*), whilst between those two dates the resulting difference in length of the *shadow or sighting-line* to its tip cast from the maximum height obtainable of 225 ft. would only be ·03 ft., or about $\frac{1}{3}$rd of an inch, when registered upon the meridian-North-ground-level.

This minute 2″ difference is smaller than usual this year—1894 was 4″ and 1900 will be 8″. Such could hardly be discerned by sighting; but as the Druids had these difficulties to solve in their day, we can readily see they had a most difficult task, and that it was imperative that they should attain the greatest possible height above a level measuring floor, because by doubling any height they doubled their registered differences, which could thus be detected.

This made it clear that their great aim would be to fix the highest possible sighting-staff upon the top of the highest practicable mound, just as we find at Silbury.

This done, they would be disappointed to find by their experiments that the Sun appeared to hover for several days so near the Solstice points that the turning day could not be differentiated. Still, by prolonged experience, they would be able to approximate those points by averaging, and so help to fix upon the

Equinoxes, which detailed examination of the daily gradations of Sun-shadows or sighting-line-tips, would show were marked by about 180 times the daily zone change of Sun Elevations when compared with the Solstice turning zone, averaging but 7½″ against the Equinoxial 23′ 31″ average measure of change.

This wide daily range at the Equinoxes would ultimately engross the attention of Druidical observers, furnishing the basis of solution for their difficulty, which was yet very great owing to the rapid apparent motion of the Equinoxial Sun Declination of 58·8″ per hour (against about ·3″ at the Solstices), and the fact that the resulting wide inter-noon gradations on the meridian line continue almost equal for about 12 days at the Equinoxes, during which it would be impossible to differentiate the Equinoxial zones, until their centre point was fixed by that prolonged experience of Solstice observations which Ancient British crude instruments and lack of records entailed.

We may therefore rest satisfied that, although the fact of their getting so near their aim at the Solstices would no doubt hold them tenaciously to that line of research over a very long period, it was inevitable that later generations of Ancient Britons should ultimately come to see that the Equinoxial gradations, *although intermediate* and not so well defined as an apparent turning point in the Sun's course, were yet far more traceable, because as we know, such gradations permanently hinged upon the Equinoxial almost *constant* daily difference in altitude of nearly 24′ 0″, whereas the complicated variations at the Solstices dwindled down to 2″, *i.e.*, about $\frac{1}{720}$th of the Equinoxial 24′ 0″ change.

The requisite graduated yearly differences tabulated upon a later page could only be detected by sighting tests on a large scale through a great height, hence for this purpose Silbury Hill had to be built to such a vast size and means devised for *Sighting* the Sun.

Makers of "Flint Implements" in this, the heart of the flint country, would obviously hold flat flint chips up to the sunlight to judge their qualities, and in due time would also notice that the Sun could be watched through flat pieces, or "Flint Scales," which would thus naturally come into use for Sun observation, just as we use smoked glass to protect the eye when watching the Sun.

The Druids had not shielded telescopes, etc. They could, however, depend upon *sighting* the Sun at noon over the top of Silbury Hill's highest *sighting staff*, through flat, parallel-sided, polished flints, placed upon the tops of fixed stones which marked the meridian Solstice, etc., lines.

Height of the Silbury Hill "Sighting-Staff."

The height of the hill we have verified by measurement, but I could not believe that a pole 100 ft. high could be raised above Silbury Hill, although my first test from the assumed 300 yards point at 15° cut the vertical line at 105 ft. The more local conditions and probabilities were considered the more impracticable that great height appeared, whilst deliberate reflection convinced me that the factors which would control the height of the pole's top above the North shadow floor would be—

(*a*) Length of pole obtainable, combined with

(*b*) The practicable maximum limits of the mound-raising powers of the people.

These together had to be raised sufficiently high to differentiate clearly the yearly recurring inter-noon Sun Elevations at the Equinoxes, hence the greatest height thus obtainable would govern the 15° Winter-Solstice (W) point of angle, instead of the line from that "sighting-point" cutting off the pole's top at the point of intersection.

What height was the "Sighting Pole" erected above the hill's top by the Ancient Britons? Was it 95 ft., or what?—That is the crucial question which seems answered and proved by the Summer-Solstice and Equinoxial "meridian sighting-line tips" respectively bounding the upper and lower edges of the North slope which was thereby defined.

These Solstice and Equinoxial lines denoted by united straight lines through the 95 ft. height *on page 294*, so significantly and exactly mark off the upper and lower edges of this artificial cone's Northern slope—as developed from Mr. Brooke's independent section (shown by Silbury Hill's heavy outline)—that there hardly seems room to doubt this conclusion.

The *dotted* lines through the 105 ft. height fall rather too much to the *right*, and the *hit and miss* lines through the 85 ft. height fall correspondingly to the *left*, whilst the 95 ft. lines decide the shape of this hill.—An odd foot or two higher or lower height of pole would still hit the North tip and toe of the hill so close that possibly 97 or 93 ft. might have been the exact height, but 95 ft. seems near enough for our test.

A moment's reflection will suffice to show that these conditions could *only* apply to this slope of Observatory Hill, because, if from any lower point of the line S a slope joined a lower point on line E, that slope would develop a lower hill, and consequently require an impossible height of pole; whilst, on the other hand, had a higher Summer Solstice ledge been taken, a vast waste of labour would have been thrown away upon the unnecessarily increased mass of the hill when the extra height was more easily attainable by erecting the tallest tree trunk upon the hill top.

The speck on the top of the hill is a man standing upon a chair.

South. North.

SILBURY HILL, as viewed from the rising ground on the EAST, showing the ring-like vallum * near the hill's top, which later investigations lead me to think was used to march the Druidical Processions round during the Plaiting of the Maypole and other Festivals, in full view of the people assembled on this Eastern and Southern Rising Ground.

We may rest satisfied that, after piling up over 1,000,000 tons by herculean labours, the erectors would not senselessly waste labour in carrying higher still a few more 100,000 tons.

From that diagram, I argue that according to the slope of the hill, the height of the pole was practically 95 ft. If not exactly that height, it must have been exceedingly near 95 ft., though the third factor which would absolutely prove the height is not yet traceable, because the Winter Solstice "Sighting-stone" has been obliterated or removed.

Local knowledge of the heights of trees so fully confirms the 95 ft. attainable height, that it seems almost a certainty when combined with the almost conclusive evidence displayed by the slope-tips being *cut off* by the Solstice and Equinoxial Sighting-lines projected from the 95 ft. pole by the Sun's rays, as shown in the "meridian section of Silbury Hill."

As a matter of fact the intersection of the Solstice line **S** *T* with the Equinoxial line **E** *E* at the point *P* marks off the actual height of the "sighting staff" used as 95 ft.

That 95 ft., together with Silbury Hill's 130 ft. height, totalled 225 ft. which (as proved on the next page by comparison with pyramid data) was practically the minimum height from which the essential year's length could be differentiated at the Equinoxes when the inter-noon transit-differences, observable by that height from the North foot of the hill, registered 4·05 ft. as against the Great Pyramid's 4·51 ft.

An extra 25 ft. (250 ft. total height) would have exactly equalled the Great Pyramid result, but the British climate would not admit of such clear and reliable records being taken as those obtainable in Egypt.

The view of Silbury opposite, with the man upon the top to relatively show its size, was taken from the higher ground North East of the hill to show the ring-like mark about 20 ft. from the top, which may denote a former lower truncated level before the Druids found it necessary to pile that extra 20 ft. height,—just as at the Gizeh Pyramids the erroneously called Second Pyramid had to be superseded by the Great Pyramid's 30 ft. higher erection, as that extra height and exact slope was so essential for Egyptian methods of observation.

To compare the effect of these differences I have prepared the following table, which brings out the telling fact that the erectors of both the Great Pyramid and Silbury Hill had to attain sufficient heights, according to their latitudes, to register a daily Equinoxial change of over 4 feet as the minimum inter-noon shadow or "sighting-line" difference by which the Equinoxial times could be differentiated to find the length of the year.

Comparison of Great Pyramid and Silbury Hill data, showing the resulting *inter-noon* difference in the lengths of shadow or "sighting-line" variations at **CAIRO, LONDON, and SILBURY**, between noon of the *nearest* two days at the Equinoxes and Solstices in 1899 and 1900:—

	Latitude.	Height of Object.	EQUINOXES. (Spring and Autumn).		SOLSTICES.			
					Summer.		Winter.	
			Difference in Meridian Altitude.	Inter-noon Shadow Difference.	Difference in Meridian Altitude.	Inter-noon Shadow Difference.	Difference in Meridian Altitude.	Inter-noon Shadow Difference.
1899.	Deg.	Feet.	Min.	Feet. †	Sec.	Feet.	Sec.	Feet.
CAIRO	30	484	24′	**4·51**	8″	*·019	2″	·013
LONDON and SILBURY §	51½	225	,,	**4·05**	,,	·011	,,	·032
1900.								
CAIRO	30	484	,,	**4·51**	·″	*·007	8″	·052
LONDON and SILBURY §	51½	225	,,	**4·05**	,,	·004	,,	·126

§ N.B.—The 225 ft. Silbury Hill height includes the 95 ft. of the "sighting staff" erected above the hill's truncated top.

† It is most significant that both nations arrived at practically the same minimum Equinoxial 4 ft. gauge as essential to differentiate the Years. *Thus they developed practically the same results at London and Cairo under local conditions by the heights of their respective erections* to determine the Standard Year.

* *These could only have been registered if the pyramid's North slope had been at 83° (nearly vertical) which they could not build high enough; whilst the most practicable Summer Solstice test, by direct shadows from the highest available obelisk near Cairo could only display an average of ·002 ft., which was a totally inappreciable difference.*

The Cairo and London latitudes with corresponding heights attained at the Great Pyramid and Silbury Hill need no comment, for the only possible slight adjustment of the latter would not appreciably affect our resulting difference in the inter-noon lengths of the shadow or sighting point gradations on the meridian North-floor line at the given times. Those for the Solstices are thus proved to be so small, owing to the extremely slight daily "difference in meridian altitude," that we can hardly conceive it would be possible to fix upon them absolutely until instruments of observation or mathematical powers were highly developed later, especially when we consider the complicated variations to which the Summer and Winter Solstices are subject, as evidenced above, where the 1899 altitude changes of 8″ and 2″ are practically reversed in 1900 to 3″ and 8″, because the differences on each side of the Solstitial day vary each year according to the divergence of the true Solstice point from the meridian noontime of the place of observation.

The controlling factor displayed by the figures **is the most significant coincidence of the large and nearly equal Equinoxial measuring gauge of over 4 ft. derived in Egypt and Britain,** which demonstrates most strikingly that the same Year-finding object impelled both peoples to erect these astounding works by national labour, to gain that "year knowledge" upon which the highest welfare of humanity depended.

Both peoples inevitably used the most feasible method of high erections, varied only in details suited to their local surroundings and climates.

It seems almost incredible, yet we find on the facts that these widely different peoples developed practically the same minimum standard Sun-gauges by the Great Pyramid and Cone (Silbury Hill) respectively, for differentiating their Season and Years;—the reason being that in both countries the uncertain length of Year necessitated an Equinoxial 4 ft. gradation of inter-noon shadow or "sighting-line" lengths to differentiate the Years and fix the basis of the Almanac.

The fact of the centre of the Avebury great circle being 10° East of the true North from Silbury Hill may later enable us to approximate the date of this Almanac-finding observatory.

Chinese records show that the magnetic compass was known about 2634 B.C., and as scientists hold that the Druids were part of the Indo-Germanic race, which originated in Asia, and the magnetic North has varied over 10° East, it is possible that the enlightened Druids might have fixed their meridian line by the loadstone, poised on sharp flints, when 10° East was the North magnetic variation.

Here we may note that the Ancient British Year ended at Yuletide, when the Sun's elevation at Silbury Hill was 15°. The Latitude of the Great Pyramid is 30° and its Equinoxial Sun elevation which determined the end of the Egyptian year is 60°.—All these are even multiples of the 15° basis of the hour-lines upon the Sun-dial and 15° sub-divisions of time into hours round the earth.

As the size of the circular top platform (104 ft. in diameter) is such as would best serve to erect thereon and hold in vertical position the 95 ft. extra obtainable height of poling required, whilst the Hill supplied

(1) Its height of 130 ft. + 95 ft. Pole = 225 ft. total height thus attained;
(2) Flat top, cut off at the Summer Solstice point;
(3) 30° Slope, for Summer gradations, down to the Equinoxial point which separated the four Seasons;
(4) Level North Area, for Winter gradation sightings;
(5) Positions of Avenues and Sighting Stones;
(6) The presence of Flints to shield the eye when "sighting" the Sun and cut the poles and logs;
(7) The adequate 4 ft. inter-noon difference of Equinoxial "Sighting-line" lengths attained;
(8) Its unmistakeably proved artificial construction;
(9) The traditional evidence as to its being a sacred place;
(10) The vastness of the work of over 1,100,000 tons, which must have been erected for some adequately worthy national purpose which united the willing labours of the people.

I submit that these comply with all the essentials for my case, and supply strong arguments in favour of this solution of the old mystery of Silbury Hill, which as the greatest National work of the Ancient Britons seems to be of even

greater historic value than Stonehenge, and altogether of superior public interest, owing to its immense mass, significant shape, and surroundings, which thus make known its great Calendar searching purpose. This is corroborated by the corresponding

(From Dr. Inman's "Ancient Pillars," etc., ex Mr. Forbes Leslie's Book.

"GILGAL" in BRITTANY, constructed by the Druidical Gauls. The Hindoos built similar mounds and vertical stones.

How highly the ancient peoples would have prized the printed Calendar of our day, which would have outshone all their other knowledge and provided the golden key to end their distracting and toilsome efforts! The true Calendar would then have been valued above all price as the essential lamp of national knowledge, requisite to ensure the well-being and prosperity of the people.

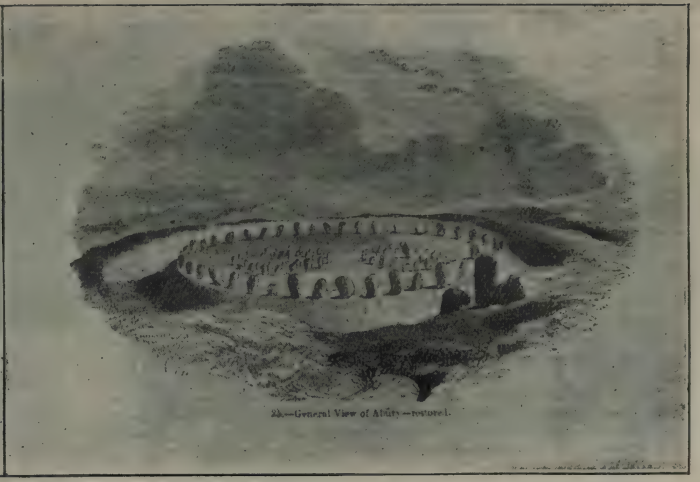
Upon the foregoing facts and arguments, I submit that the purpose for which Silbury Hill was erected is thus satisfactorily explained, and I trust that we shall thereby be led to appreciate more highly the self-denying, persevering efforts and mental attainments of the Ancient Britons, whose works ought to be recognised as National relics to be held by the Nation, and not merely the private property of individuals, who should no longer be allowed exclusive powers over them.

Sir John Lubbock (now so appropriately raised to the Peerage as Lord Avebury) is such a noble public custodian that, as the owner of Silbury Hill and the Avebury Druidical circle, the public have the fullest confidence in him; but we cannot be certain that his high standard will be perpetuated in his successors.

The inflated price of £186,000 recently asked by the owners of the Stonehenge Estate should be taken as a public warning.

These historic piles are in reality the property of the Nation—part of British History—quite outside the unfortunate private ownership of the land, the mere granting of surface power over which ought not to lower the British people's rights to mere permission to see them. The Nation ought to own them without paying any fictitious price for them.

Arch-Druid in full Judicial Costume, with Insignia, etc.

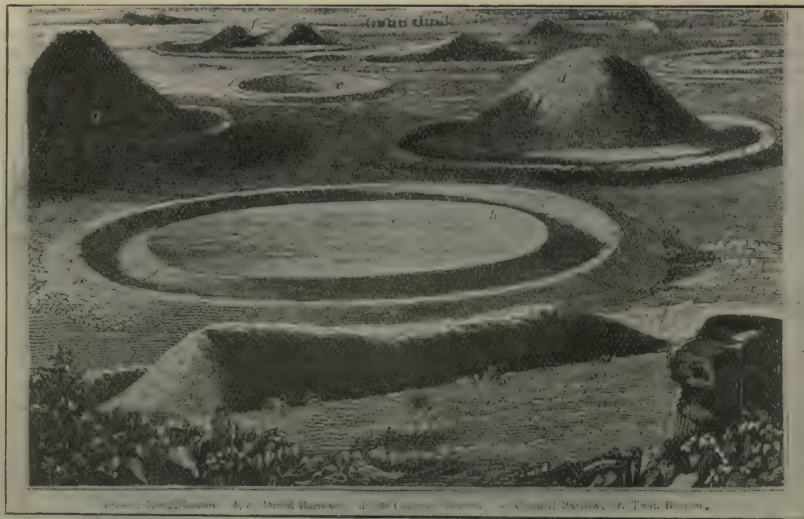


General View of the very Ancient and DRUIDICAL CIRCLE, at AVEBURY, in Wiltshire, ENGLAND.

From "Old England," by kind permission of Messrs. Chas. Knight & Co., London.

Note the Orbit-like Breast-plate, Sun and Moon discs, and also the "Abacus" or counting frame under the Druid's left hand, which holds the "Sighting Instrument" for taking observations necessary to ensure food in due Season.

Note the wide deep "Vallum" around the large circle of huge vertical stones weighing about 30 tons each, one of which is shown on page 320. The smaller circles within the larger one represent the Sun and Moon.



From "Old England," by kind permission of Messrs. Chas. Knight & Co., London.

Examples of BRITISH DRUIDICAL BARROWS or MOUNDS.—Note the plate-like circular areas *b* and *c* surrounded by depressed ring-like "Vallums," which should be studied in relation to each other and neighbouring Druidical Observatories.

Remains of OLD SARUM, in Wiltshire, England, showing its truncated top and tiers of entrenchments or "Vallums." This relic of past greatness returned two Members to Parliament until 1832.

Vallums.

The Ancient British "vallums," with deep saucer-like-edges round Stonehenge, Avebury, and many of the later beautifully moulded "Barrows," were most probably first used as slightly elevated fixed observatory circles for finding the star positions as the observers lay upon the up-curved slope "sighting" the star movements over the vallum's edge to the tops of a series of surrounding "*sighting-staffs*;" just as subsequently the smaller fixed stones of Stonehenge's *inner circle* could more efficiently be used as points from which radiating star-lines could be *sighted* and fixed upon for comparison across the outer circle's elevated rim for lower elevations, and to the series of higher "*sighting-staffs*" fixed around for higher elevations.

Such readers as incline to doubt the use of "*sighting-staffs*" will upon reflection find it impossible to conceive of any better observatory indicator available for primeval men. The "Grooved-stone' at Stonehenge clearly demonstrates that such poles were then used there. We have only to go back to the books of the last century to prove that staffs were then in use, as shown by the staff lengths represented upon the last pink page, and the prominence given to "*the Art of Shadows and Mechanic Dialling*," by Leadbetter, 1737, and writers from the earliest times, until clocks and watches came into wide-spread common use during the 19th century.

No doubt these Vallums were also used as open-air schools or places for demonstrating the physical phenomena of the Seasons, etc., to the assemblies sitting round for public guidance.

Whilst Avebury and Silbury were the earlier centres of Almanac research, Stonehenge was later the most finished Ancient British centre of learning or open-air university, where the leaders of Druidical thought could best demonstrate to the rising British youths the knowledge and signs of the Seasons and Year so far as then discovered. Such early education was of prime importance to the future leaders of the widely scattered communities in Britain, when the bulk of the people, though untaught, were governable by clanship, hence the chieftains' sons were wisely sent from home to be suitably trained for their future responsibility by the learned Druidical Elders.

Probably that characteristic training of the leading Britons in the dim ages of the past has had a strong influence upon the development of those British qualities of self-reliance, originality, and enterprise which have so powerfully helped forward the formation of the British Empire, mainly through the invigorating and strengthening influence of our public school life, which seems to have originated in the Druidical system, to which it may thus be traced.

1. The "FRIAR'S HEEL" outer stone).

2. The "GROOVED STONE" is the smaller upright one, upon which the tallest monolith is leaning.

STONEHENGE from the WEST—showing the distant "FRIAR'S HEEL" SIGHTING STONE, as used to mark the SUMMER SOLSTICE SUN-RISE on the LONGEST DAY (June 21st) when viewed from the FIXED SIGHTING POINT marked by the "ALTAR STONE."

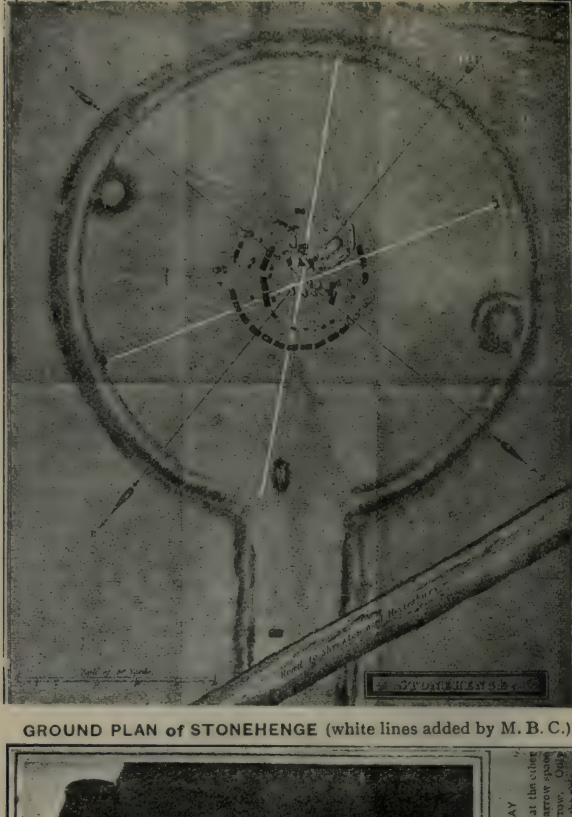
Some friends, who had seen proofs of the above, asked me to investigate Stonehenge, but my enquiries have already expanded so widely that the present remarks thereon must be limited to its bearing on Almanac development.

Local inspection of Stonehenge did not impress me with its Sun-searching facilities as being much greater than those of Aldborough. Though the stones are far more numerous, the heights obtainable would not suffice to determine the Year's length, but seemed more designed for lunar and stellar research.

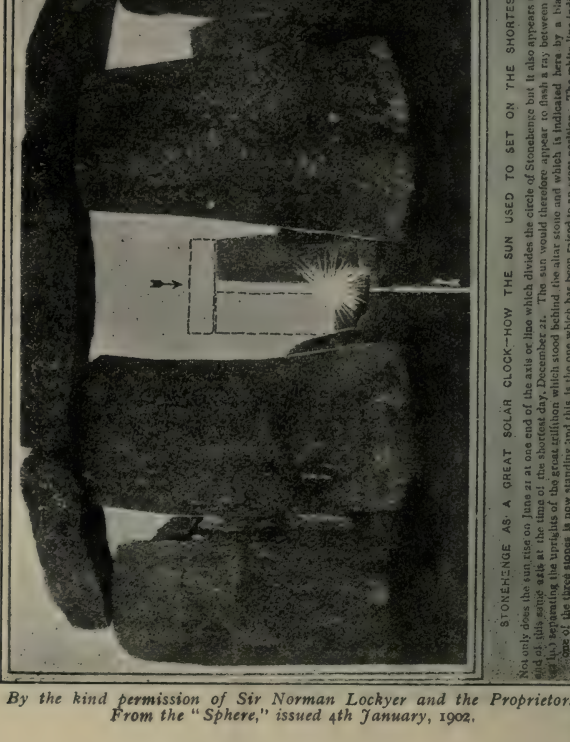
The most certain fact yet ascertained respecting Stonehenge is that at Sunrise on the *longest day in the Year* (the *Summer Solstice* day) **the earliest Sun's rays pass straight over the top of the "Friar's Heel" to the Altar Stone in the centre of the circle.** That significant evidence (surmised about the middle of the 18th Century) has been placed beyond the possibility of doubt by the repeated tests of eminently cautious scientific men, from Dr. Thurman's day in 1858 to the present time, when many persons go long journeys to be there at Summer Soltice-dawn to verify this fact, which cannot be shaken.

Now that is unquestionably the most vital point the Druids could there aim at, towards testing the length of the Year by gauging the two terminal "amplitude" points of Sun-rise variations along the horizon. This *Summer Solstice Sun-rise* point could practically be checked each year, whereas the uncertain weather, through clouds, mists, etc., at the Winter Solstice, made the latter of altogether minor value; hence, if some utilitarian person during the intervening 2,000 odd years has removed the Winter stone, which is not yet traced, that does not impair our argument, for the Winter Solstice would almost certainly be watched by "*sighting*" the mid-day Sun from the direction of the "Sighting Staff's" shadow, but that means would be less guide still at the Summer Solstice.

The "Friar's Heel" and the other odd outside stones mark the "amplitude" or Solstitial extremes of the Sun's varying Seasonal Rising and Setting points; but the "Grooved-stone," does not provide adequate support for a sufficiently high pole to throw a long enough mid-day shadow to trace the year, though it may have been used as a rough "sighting guide" for the Winter Solstice. It appears more likely to have been used to trace the Moon's motions, which were much more easily seen and understood by *sighting* over lower observatory poles or shadow-pins, when once the principles of the Sun's movements had been grasped.



GROUND PLAN of STONEHENGE (white lines added by M. B. C.)


STONEHENGE AS A GREAT SOLAR CLOCK—HOW THE SUN USED TO SET ON THE SHORTEST DAY
Not only does the sun rise on June 21 at one end of the axis or line which divides the circle of Stonehenge but it also appears to set at the other end of this same axis at the time of the shortest day, December 21. The sun would therefore appear to flash a ray between the narrow spaces (A) separating the uprights of the great trilithon which stood behind the altar stone and which is indicated here by a black arrow. Only one of the three stones is now standing and this is the one which has been raised to an erect position. The white line indicates the axis

By the kind permission of Sir Norman Lockyer and the Proprietors. From the "Sphere," issued 4th January, 1902.

STONEHENGE.

The ground plan of STONEHENGE opposite shows the prostrate "Slaughter-stone" near the Vallum's entrance, and near the roadway the celebrated "Friar's Heel" Monolith, over which the Sun rises at the Summer Solstice. The surrounding circular Vallum is over 300 feet in diameter.—*From "Stonehenge and its Barrows," by kind permission of Wm. Long, Esq., M.A., and the Wiltshire Archæological Society.*

The misnamed "Slaughter-stone," prostrate near the entrance to the great "Vallum," is 21 ft. long and 6 ft. 10 in. wide. It originally stood erect, as Mr. Cunnington, F.S.A., writing to Mr. Britton from Heytesbury, April 12th, 1803, clearly says:—

"I will pledge myself to prove that Mr. King's "'Slaughter-stone' stood erect. . . . . To "ascertain whether the Slaughter-stone stood "erect, I dug round it, and also *into the "excavation where it originally stood "when erect.*"—*Vide page 57 of the authenticated record of "Stonehenge and its Barrows," by Wm. Long, Esq., M.A., etc., as printed in the "Wiltshire Archæological Magazine.*"

Unfortunately Mr. Cunnington does not define the site of that hole, but he goes on describing the stone in detail as sketched on page 93 of that magazine, to show that its broader end was socketed into the chalk floor in like manner as the great "leaning stone" was shown to be in Sir Norman Lockyer's interesting illustration on page 27 of the *Sphere* for January 4th, 1902.

Sir Norman Lockyer's perspective view on the next page shows the Mid-Summer Sun rising across the now prostrate stone, which I thus believe formerly stood erect in line with the vertical "Friar's Heel" stone to align the "*Amplitude*" of the Summer Solstice, just as I believe Jacob when serving Laban more crudely used his notched Amplitude rods to stake out the Seasons for breeding his flocks.

In the same way the long rows of vertical stones at Carnac, in Brittany, were used by the French Druids to locate the Seasons.

Please note Sir Norman Lockyer's remarks (at the side-foot of the preceding illustration) which prove that the now re-erected "leaning-stone" bounded one side of the Axis-line of Saurise at "Mid-Summer." He writes:—

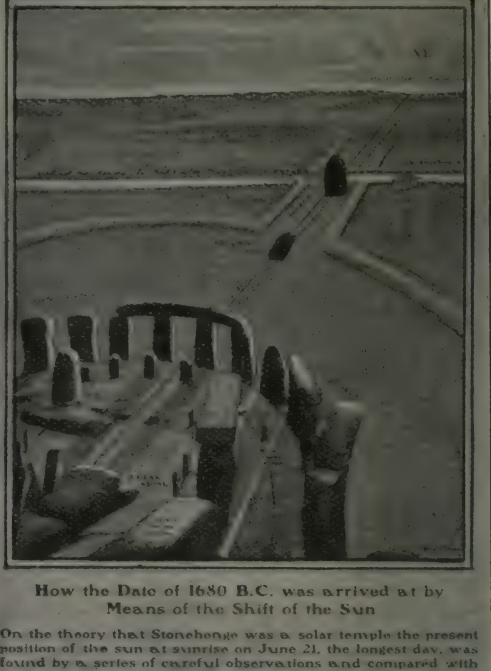
"Not only does the Sun *rise* on June 21st at one "end of the Axis or line which divides the circle "of Stonehenge, but it also appears to *set* at the "other end of this same axis at the time of the "Shortest Day (December 21st)."

That, as shown by the white Axis-line, agrees with my observations previously taken across the Tower of York Minster, as per the diagram on page 154-h, and confirms the probability that formerly a Winter Solstice stone marked the direction of Sunset at the South-Western end of that white Axis-line during the Yuletide Festival.

Again we find strong corroboration by the fact that about a corresponding distance across the due East and West lines which marked

(*To page 325*)

STONEHENGE OBSERVATIONS taken by Professor Sir Norman Lockyer (of the Solar Physics Observatory, London), on 21st June, 1901, to find the date of the Foundation, which appears to be about 1680 B.C.—*By kind permission of Sir Norman Lockyer and the proprietors of the "Sphere," issued on 4th January, 1902.*



How the Date of 1680 B.C. was arrived at by Means of the Shift of the Sun

On the theory that Stonehenge was a solar temple the present position of the sun at sunrise on June 21, the longest day, was found by a series of careful observations and compared with the position which it must have occupied when the temple was built. The old line exactly bisected the avenue which points to the N.E., but a line drawn from the rising sun on June 21 last to the centre of the stone circles is deflected from this old line to the extent shown here, nearly two diameters of the sun. As the rate of the sun's shift in position at sunrise on the summer solstice is known it has been possible, in brief, to subtract the one position from the other and to ascertain from tables of the obliquity of the ecliptic the number of years which must have passed while this shift of the sun from its position at the end of the old axis has been taking place. The number of years amounts to 3,581, thus giving a date of 1680 B.C.

ARCH-DRUID and DRUIDS in Council under the Sacred Oak.—*From "Old England," by kind permission of Messrs. Chas. Knight & Co., London.*

the *Equinoxes*, there are two Vertical Stones which strange enough do not appear to have attracted the attention of earlier writers and so have not been explained, although they are very significantly placed across what we may term the "Winter Sunrise and Summer Sunset line," which I have connected by a white track through the centre of the circle and at a corresponding angle shown as a white track what may formerly have been either a Summer Sunrise and Winter Sunset line, or more probably the line marking the Ancient Druidical Festivals of "Beltane" (May-Day) and "Halloween" (November 1st) by their respective Sunrise and Sunset Stones.

Very likely the same stones served to mark the "Farmers' Year" Seasons, as Sir Norman Lockyer's articles in *Nature* have shown the strong hold which the Harvest, etc., Seasons had on early Historic and Pre-historic peoples, and of course the line of Sunrise on May 1st extending through the centre of the circle would terminate at the Sunset Stone which marked Halloween on November 1st.

The very marked direction of the May-Day (Beltane) and Halloween line registered at Maes-howe strongly corroborates that probability.

Certain it is that the line connecting the two stones cuts the Equinoxial East and West line at 30°, which, with the counterpart of the white track, demonstrates Euclid's "*pons assinorum*" problem of equal angles, closely studied by ancient peoples who counted 30-day months, and appear to have reasoned in multiples of 3°, 30°, etc. Their Observatories were 3° apart as already shown.

The 3° between Aldborough (Yorks.) and Stonehenge would obviously reduce the "Amplitude range" of those diagonal white tracks when compared with the York Minster Observatory Diagram, but not to 30°, therefore the probability is that the two cross-line edge stones locate the "Farmers' Year," but it is quite possible that the learned "Druids" used these smaller stones during very many Centuries to mark the "Amplitude register" of the "*Precession of the Equinoxes*," which may have been known to them as a very slowly shifting Factor when locating the "Sun's Amplitude" over long periods, as Sir Norman Lockyer's illustration shows, though they could hardly have known its cause in the Earth's greater bulge near the Equator.

Whilst we may regard Sir Norman Lockyer's date of 1680 B.C. as approximately indicating the Age of Stonehenge, in the absence of historic records we may never be able to find its exact period, because of the uncertain and almost unsolvable problem of "Changing Latitude," which could not be computed in Sir Norman's calculations, as precise data for it were and still are unknown.

But clearly any "Change in Latitude" would affect the "Amplitude" of Sunrise and Sunset between the comparative periods during which the change occurred, therefore

as evidence of such "Changing Latitude" is given in the last pages of the Pyramid Section, and that change would disturb the calculation made for the Age of Stonehenge, I submit that no one can do more than approximately indicate the Ages of the great antiquities of Stonehenge, Silbury Hill, Maes-howe, etc., or yet the early Pyramids, etc., without precise Historic Records, and as the early Historians used varying lengths of years which confused historic periods and Chronological Tables, we had better be content to accept the nearest approximate dates derivable from the best evidences combined.

That Stonehenge is very Ancient is evident from historical records.

"The account which Julius Cæsar gives of the "Druids of Gaul, marked as it is by his usual "clearness and sagacity, may be received without "hesitation as a description of the Druids in "Britain: for he says, 'the system of Druidism "is thought to have been formed in Britain, "and from thence carried over into Gaul; and "now those who wish to be more accurately "versed in it for the most part go thither [i.e., "to Britain] in order to become acquainted with "it.' Nothing can be more explicit than his "account of the mixed office of the Druids: "'They are the ministers of sacred things; "they have charge of sacrifices, both public and "private; they give directions for the ordi- "nances of religious worship (*religiones inter- "pretantur*). A great number of young men "resort to them for the purpose of instruction "in their system, and they are held in the highest "reverence. For it is they who determine "most disputes, whether of the affairs of the "state or of individuals: and if any crime has "been committed, if a man has been slain, if "there is a contest concerning an inheritance "or the boundaries of their lands, it is the "Druids who settle the matter: they fix rewards "and punishments; if any one, whether in an "individual or public capacity, refuses to abide "by their sentence, they forbid him to come to "the sacrifices. This punishment is among "them very severe; those on whom this interdict "is laid are accounted among the unholy and "accursed; all fly from them, and shun their "approach and conversation, lest they should "be injured by their very touch; they are "placed out of the pale of the law, and excluded "from all offices of honour.' After noticing "that a chief Druid, whose office is for life, "presides over the rest, Cæsar mentions a "remarkable circumstance which at once "accounts for the selection of such a spot as "Sarum Plain for the erection of a great national "monument, a temple, and a seat of justice:— "'These Druids hold a meeting at a certain "time of the year in a consecrated spot in the "country of the Carnutes (people in the neigh- "bourhood of Chartes), which country is con- "sidered to be the centre of all Gaul. Hither "assemble all, from every part, who have a "litigation, and submit themselves to their "determination and sentence.' At Stonehenge, "then, we may place the seat of such an assize. "There were roads leading direct over the plain "to the great British towns of Winchester and

"Silchester. Across the plain, at a distance "not exceeding twenty miles, was the great "temple and Druidical settlement of Avebury. "The town and hill-fort of Sarum was close at "hand. Over the dry chalky downs, intersected "by a few streams easily forded, might pilgrims "resort from all the surrounding country. The "seat of justice, which was also the seat of the "highest religious solemnity, would necessarily "be rendered as magnificent as a rude art "could accomplish. Stonehenge might be of a "later period than Avebury, with its mighty "circles and long avenues of unhewn pillars. ". . . . . The justice executed in that "judgment-seat was, according to ancient "testimony, bloody and terrible. The religious "rites were debased into the fearful sacrifices of "a cruel idolatry. But it is impossible not to "feel that at the bottom of these superstitions "there was a deep reverence for what was high "and spiritual: that not only were the Druids "the instructors of youth, but the preservers "and disseminators of science, the proclaimers "of an existence beyond this finite and material "world—idolaters, but nevertheless teaching "something nobler than what belongs to the "mere senses, in the midst of their idolatry. "We give entire what Cæsar says of the religious "system of this remarkable body of men:—

"'It is especially the object of the Druids "to inculcate this—that souls do not perish, "but after death pass into other bodies; and "they consider that by this belief more than "anything else men may be led to cast away "the fear of death, and to become courageous. "They discuss, moreover, many points con-"cerning the heavenly bodies and their motion, "the extent of the universe and the world, the "nature of things, the influence and ability of "the immortal gods; and they instruct the "youth in these things.

"'The whole nation of the Gauls is much "addicted to religious observances, and, on "that account, those who are attacked by any "of the more serious diseases, and those who "are involved in the dangers of warfare, either "offer human sacrifices or make a vow that "they will offer them, and they employ the "Druids to officiate at these sacrifices: for "they consider that the favour of the immortal "gods cannot be conciliated unless the life of one "man be offered up for that of another; they "have also sacrifices of the same kind appointed "on behalf of the state. Some have images "of enormous size, the limbs of which they "make of wicker-work, and fill with living men, "and setting them on fire, the men are destroyed "by the flames. They consider that the torture "of those who have been taken in the commission "of theft or open robbery, or in any crime, is "more agreeable to the immortal gods; but "when there is not a sufficient number of "criminals, they scruple not to inflict this "torture on the innocent.'"—*From page 6 of "Old England," published by Chas. Knight & Co., London.*

Too much has been made of Julius Cæsar's hazy records of torture to the victims of Druidical sacrifices, regardless of the fact that the cultured Romans about a century later inflicted far worse and more wholesale

tortures upon the innocent early Christians who were only striving to convert their generation to nobler ideals of life.

Indeed, we may reasonably believe that those Druidical sacrifices did not inflict a thousandth part of the cruel torture which the Leiters, Sullys, and other unscrupulous manipulators on the Produce Exchange now inflict so unmercifully upon the defenceless poor, who have to suffer the long-drawn-out pangs of hunger and bear the heart-rending torture of seeing their wives and children famished by that iniquitous gambling which we bemoan whilst it is acute, and then allow to continue by foolishly lapsing into a listless attitude, as though we were helpless to protect ourselves against such pirates of Society.

Yet we severely punish poor boys who play "pitch and toss" for a ½d. or cent, whilst the monsters of "produce" gambling iniquity play false, not only with millions of money, but even endanger millions of lives and starve thousands, without any practical effort being made to punish them as they deserve.——— Not only that, even when those gamblers fail, they are allowed to make a luxurious living out of their dupes, and pass muster as though they were superior to the industrious deserving people who, by honest labour and careful living, create the wealth which those unscrupulous gamblers scoop up and dissipate.

That sturdy British courage which the Druids so thoughtfully developed in the Ancient Britons by the belief in a future life (as recorded by Julius Cæsar and other historians) would have prevented any selfish few from thus handicapping the rightful progress of their fellows, as the American Trust Builders are doing by taking advantage of the Cosmopolitan population in the United States.

Such stupendous erections as Stonehenge and the 1,100,000 tons of the artificially-piled Silbury Hill prove that the Ancient Britons worked together for their common good, to secure true Almanac and Systematic Time to enable them to unitedly make the most of their Seasonal opportunities, and thus increase the social comfort and happiness of all around them.

They knew more of the happier blessings of health-giving work in the open air, and had not developed that insane craze for wealth and pride in "doing-nothing," which is leading so many now-a-days to lead selfish miserable lives in defiance of natural laws, which inflict obvious penalties in ill-health, wasted lives afflicted with ennui, and decaying families.

Greed and grasp (euphemistically called "Self-Interest") always have and always will produce misery so long as they are allowed to have sway.—Surely it is time men learned that they can only live in one house at once, wear one suit at a time, eat one meal and drink a limited quantity at one time.

The Druids shared their spoils and produce of the chase, ostracising anyone who dared to take more than his share, and looking down upon such greed as mean and contemptible.

In that they set us a practical example, as their contempt did not end with an ineffective curl of the lip, but upheld such an effective boycott as to crush out that greed and raise the nobler and more generous natures of the people.

The Huge Stone of the Avebury (Wiltshire) Druidical Circle compared with the like Stones at Manipur (India).—*Reproduced by the kind permission of Sir Norman Lockyer and the Proprietors of the "Sphere," issued 4th January, 1902.*

A HUGE STONE OF THE AVEBURY CIRCLES.

At Avebury, twenty miles north of Stonehenge, there are a number of huge stones scattered amongst cottages and farmhouses, which once formed part of a huge circle of stones. In the height of its prosperity this megalithic temple must have been one of the most wonderful in the world, for it was surrounded by a double row of stones, and inside this circle were two smaller ones with diameters of 150 and 340 ft.

A STANDING STONE NEAR MANIPUR, INDIA.

This standing stone, which is rough and unhewn, is only one of a great number within a few miles, especially in the northern portion. It is not unlikely that the heavy standing stone in front of the stone, could be clearly seen. Besides these single stones there is also a large group of monoliths near Manipur, the average height in a semi-circular space.

10.—Astronomical Instrument.

10.—Two Druids. Bas-relief found at Ardan.

ASTRONOMICAL INSTRUMENTS of the DRUIDS.
From "Old England," by kind permission of Messrs. Chas. Knight & Co., London.

The ASTRONOMICAL INSTRUMENT (*with its quadrant and half-quadrant 8 knob circles around it*) to the left was found within a Druidical mound in IRELAND. Note its centre cone like Silbury Hill to locate the centres of the Sun and Moon during observations. It is held to typically represent the cycles or orbits of the Sun and Moon when viewed at their Quadrants and Intermediate Points.

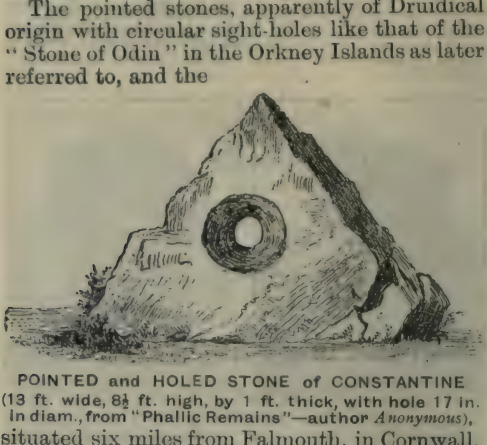
The Druid shown next to the Sun holds the "horned" crescent of the Moon, probably also used as an Astronomical Instrument.

It is most significant that a very similar instrument was found by Mr. R. N. Hall, during January, 1903, whilst excavating in those marvellous ruins of Zimbabwe in Rhodesia, which constitute the grandest group of ancient structures not only in South Africa but in the Southern Hemisphere.

Mr. Hall, writing in the *Sphere*, page 238, for June 13th, 1903, states that he there found a "Solar Disc (made from Soapstone) carved "with a circle surrounded by 8 smaller "circles or knobs, similar to the markings on "the ornate object previously found at Zimbabwe "and pronounced by Mr Bent to be a 'sun-image.'"

Vertical Stones were found at Zimbabwe in specially interesting positions, but the general reader will more fully understand the use of the isolated stones placed outside the Druidical Circles from the later description of Maes-howe.

The pointed stones, apparently of Druidical origin with circular sight-holes like that of the "Stone of Odin" in the Orkney Islands as later referred to, and the



POINTED and HOLED STONE of CONSTANTINE (13 ft. wide, 8¼ ft. high, by 1 ft. thick, with hole 17 in. in diam., from "Phallic Remains"—author *Anonymous*),

situated six miles from Falmouth, in Cornwall, had definite alignment relations to Season-pointing. vertical Stones, etc., and seem designed to gauge the Sun as disced on the apex at the Summer Solstice, and through the aperture at the Winter Solstice, when sighted from a fixed point of observation.

Our friends abroad in America, France, Germany, Russia, Scandinavia, Austria, Spain, India, etc., find in their Countries similar Ancient Stone Circles, Mounds, etc., which doubtless had the same origin and use for Almanac purposes.

Though the wonderful alignments at Carnac in Brittany are very extensive and the truncated mound in that District is large, the magnitude and better finished character of the British Druidical remains at Stonehenge, Avebury, Silbury Hill, Maes-howe, etc., confirm Julius Cæsar's statement that Britain was the chief resort or leading stronghold of Druidical culture. His translated record *ex "Old England"* reads, "The System of Druidism is "thought to have been formed in Britain, and "from thence carried over into Gaul, and now "those who wish to be more accurately versed in "it for the most part go thither."

To avoid further repetition and facilitate the quick absorption of these ideas by busy readers, my explanation of the general use of Druidical Circles and Stonehenge's evidence of "Changing Latitude" is deferred until the "Summation." I will, therefore, conclude this section by a representation of "Stonehenge Restored," to illustrate its appearance when complete, and follow that with a description of its characteristic features, and the Golden Druidical Almanac there discovered, ending with the later development of the Observatory Gallery and Interior Chambered Mound of Maes-howe as further evidence of "Changing Latitude" and conclusive proof of the thoughtful training of the Druids, whose standard of civilization was far higher than has hitherto been credited to them.

The Ground Plan of Stonehenge here shown indicates that it was probably one of the latest, as it was one of the most perfect, of those Druidical Sun Observatories known as Stone Circles, by which our Ancestors regulated their Almanac Times for Sowing Seeds, etc.

The "RESTORED" GROUND PLAN of STONEHENGE.

The *Perspective Elevation* indicates how it might look if restored, whilst the *Section* to the right displays the interior view with the Altar and Trilithons suggestive of similar scenic effects in some Cathedrals of our time.

The lower illustrations of Ancient Druidical Circle Stones at Darab, in Southern Persia, compare with the like stones, shown on a previous page, from our Ancient Avebury Circle and the similar Stone Circle at Manipur (India).

These odd outside stones also seem to mark the direction of the Sunrise and Sunset Solstice lines to locate true orientation between, and *not* that there was an outermost *circle* of stones at the "Friar's Heel" distance from the centre of the Stonehenge group. The circular arrangement of the Observatory betokens the Druidical uncertainty of orientation, as then any adjustment could simply be made by removing one or more of these singular stones. The Druids had not reaped the great advantage gained by the earlier Egyptian Sphinx experiments; yet they were wiser in utilizing the adjustable cone method at Silbury Hill, to obviate the repeated herculean efforts which the Pyramid method rendered necessary; for, when once a pyramid was built, its orientation could not be re-adjusted and the only means of correcting the error was to build a fresh and improved pyramid, though there are traces in some of the Southern ones that patchwork attempts were made to rectify the earlier pyramid slopes, etc., as at Dashoor (page 20).

The most characteristic feature of Stonehenge seems to be the huge elevated outer circle of imposts, formerly laid upon the 30 upright stones at a height of about 13 ft.—Thus placed, they appear specially arranged as a circular gauge by which to trace the circular movements of the Stars during the respective Seasons of the Year, after the Silbury Sun Observatory had secondarily been used for that lunar research which would obviously lead observers to note that from the Seasonal positions of the Stars, the Seasons, and Year's length could best be traced when sighted at fixed points upon an elevated observatory circle as provided at Stonehenge. To that extent this confirms the conclusion that Stonehenge was a development of later ideas and methods than those of Silbury and Avebury.

The 30 stones, as typifying the days of the months (as well as the $\frac{360°}{30}$ = 12° gradations of the daily and yearly circle), and the 6 large trilithons, as representing the 6 monthly rises of the Sun to the Summer Solstice and the corresponding 6 gradations back to the Winter Solstice, were suggested on page 9, but, as I wanted more definite evidence of the origin of the Almanac, there seemed a slender but just possible chance of finding some trace of it in the Druidical relics which have been unearthed from the Ancient British "barrows," or burial mounds, at Stonehenge.

Accordingly, I searched the records, etc., and opposite page 183, in "Stonehenge and its Barrows," by William Long, Esq., M.A. (1876), I was rewarded by finding that a plate of gold, "7 by 6 inches in its longest diameters, and perforated at the two angles most distant from each other" was found, "immediately over the breast of the skeleton," in Bush barrow, half a mile South of Stonehenge. (*With this skeleton were the richest Druidical treasures yet found.*)

This is reproduced below from the original engraving, and beneath that, for purposes of explanation (as no prior solution seems to have been found), I have re-drawn the significant zigzag outline and placed therein the 4 numbers

GOLDEN ALMANAC worn as a BREASTPLATE by the ARCH-DRUID of STONEHENGE.

SIX-TIER TRIANGULATED RHOMBOID ALMANAC.

of the "quarter-moons," *which were undoubtedly the simplest means of recording time which primitive men could adopt.* Each 4 of these, as marking a lunar *month*, I have bracketed together on the outside and numbered bolder in their order as the months of the Year.

ALMANAC RECORDS BY QUARTER-MOONS.

Beginning at the Winter Solstice, the connected quarter-moon lines work out at 3 months to the Spring Equinox, and after rising to the end of the 6th month denoting the Summer Solstice, begin to descend by the Autumnal Equinox at the 9th month to the Winter Solstice again reached at the end of the 12th month.

The remarkable wedge-like breaks at the Solstice points betoken the inability of the Druids to fix upon them absolutely, and probably have been purposely left open to alternately add there the 9 days (represented by the 9 central squares) to the 354 days of the 12 lunar months, making 363 days as their then ascertained adjustment for the length of the Year.

(The earliest counting would undoubtedly be by means of the 10 digits of the hands which, plus the 10 toes, made the count of the 30 days' month (moon) to alternately end at the fingers and toes, thus:— 10 fingers+10 toes+10 fingers=1st month-end. As they also counted days in scores, they would continue, 10 toes + 10 fingers + 10 toes = 2nd month-end. In that way the earliest races would become habituated to alternated endings above and below.)

These two Solstice breaks apparently indicate some doubt in the Druidical mind as to the exact number of days' adjustment required, and, considering the almost inexplicable varying factors involved in finding the true Year's length (as shown in the pyramid portion hereof), we may be sure that its real length was not then known within a day or fraction of a day, which would have to be roughly adjusted for after long periods.

Anyhow, their first only possible Almanac would depend upon the obvious *quarter-moon gradations*, because the meagre population so widely scattered would certainly have got various conflicting records had they relied upon counting the days before writing or figures were known, as lapse of memory, monotony leading to carelessness and other human weaknesses in those warring troublous times, made large numbers of daily counts uncertain,—whereas the phases of the Moon would be shown to all, and most conveniently relied upon for fixing the times of public assemblies and national use.

We may therefore take it that however near they had got to the Year's length, their adjustments at the Solstices on this zigzag Almanac were bound to be by *quarter-moon units*, just as we have to adjust for the extra quarter-day per year by a day unit each Leap Year, because our Almanac counts by days.

We cannot add ¼ or other fractions of a day to the Almanac to move the beginning of New Year's day to night times, because the natural day is impressed upon all people's minds by Sunrise, so that the day is an indivisible, inexorable, and imperative Almanac unit.

The consideration of the essential application of this *quarter-moon unit* shows that by adding one of those units on 3 consecutive Solstices and omitting every 4th (at the end of the 2nd Year), the Lunar Year of 354 days was adjusted by $\frac{29{\cdot}53 \text{ days} \times 3 \text{ quarter moons}}{4 \text{ quarter moons} \times 2 \text{ years}} = 11 \text{ days}$ to the 365 days' Year; yet, as the quarter-day error accumulated to a quarter-moon about every 30 Years, it would thus later alternate the adjustment of this *quasi-Leap Year omission* between the Winter and Summer Solstices, exactly where the characteristic wedge-like space seems left for the purpose.

Those shifting *quarter-moon adjustments* made it inadvisable for the quarters of the months or the monthly points to be numbered, even if written numbers were then known, as the shape of this perpetual Almanac was quite sufficient to mark the vital Solstice and Equinoxial times for public purposes.

The Moon was thus their Time-piece, marking in long, slow stages the Time, as we now use the clock—indeed, many of the old clocks still in use continue to show this *quarter-moon arrangement*, working in an improved circular form *as the basis of our WEEK*. I therefore expected to find that the Druids used an Almanac marked in *Quarter-moon-weeks*.

Knowing from experience that the orientation of the Aldborough "Arrows" was placed wrong in the engraving of them in that old standard book "Eboracum," *I could not trust an engraving like a photograph* and was therefore anxious to verify Mr. Long's engraving of the "breast-plate" with the original, to make sure of its zigzag markings, and accordingly went to see it at the Devizes Museum as a photograph could not be obtained.

Upon examining it in the presence of the hon. curator, Mr. B. Howard Cunnington, I at once saw that the engraving was wrong, as the "breast-plate" showed but 5 triangles based upon the outer line of each edge of the plate, whereas the engraving showed 6.—How that error arose is not for me, but the heads of the Wiltshire Archæological Society to explain.

But, although that old engraver's or writer's blunder seemed at first sight to negative the idea of the breast-plate having been used as a perpetual Almanac, my belief that the Druids must inevitably have had some such means remained unshaken, because study on natural lines suggested such record was imperative, owing to the impossibility of otherwise subdividing *their first long-time (lunar) unit of* 29·53 *days*, when the records of large numbers of days were unreliable and impracticable, until a fixed Year in complete days was later evolved as the basis of "Time," for which the simple day is too insignificant to be appreciable or workable as a long-time-unit.

ORIGIN OF THE WEEK.

Our Yearly counting of Time is most practically known to us by the *weekly* progressions on the Almanac, because the *week* is the most convenient unit of social life, and was undoubtedly derived from those most emphatic signs of the moon, which as "Quarters" of the 29·53 days lunation average a week of about 7⅜ days, which had to be taken to the *nearest day*, as day-fractions could not be used.

From New Moon to First Quarter
(West half of moon showing) = 1st week.
„ First Quarter to Full Moon ... = 2nd week.
„ Full Moon to Last Quarter
(East half of moon showing) = 3rd week.
„ Last Quarter "Waning to New Moon" = 4th week.

Such "weeks" constituted the only practicable sub-divisions of the month and year to the primeval scattered races of men.

The "horned"-gold-circlet found in the same Stonehenge barrow seems most distinctly to represent the narrow, crescent portion of the bright part of the Moon in its first (West) and last (East) phases, which have from time immemorial been typically described as "horned" by astronomers.—This indicates that the Druids carefully noted the phases of the Moon, as also did the Mohammedan Arabs, who adopted the *horned* (crescent) moon as their symbol of power, still used as the emblem of the Turkish Empire.

The old use of these *quarter moon-weeks* is distinctly traceable, as obvious sub-divisions of the *lunation* in our literature, where "*fortnight*" (14) was derived from the *half*, and *sennight* (7) from the *quarter-moon* periods, which of necessity first had to be counted by nights.

The late Lord Tennyson (poet-laureate) wrote :—

"My love for nature is as old as I ;
"But thirty moons, one honeymoon to that,
"And *three* rich *sennights* (*i.e.*, 3 weeks or ¾ moon) more."

Here I may point out the fact of the Quarter moon period being about 7⅓rd days, and the Solar Year 12⅓rd lunations probably had a marked effect upon Druidical methods of research. Those *thirds* may have led to that preference for *thirds* and *threes* evidenced in the 3° differences between the sites of their observatories, the *trilithons* (3) 30 upright stones, and 300 feet diameter of the Stonehenge circular area, which shows that the Druids must have known that the circumference of the circle was about *three times* the length of its diameter.

As an index to the methods of primeval races we may take experience, which proves that the first thing an intelligent child does with a pair of compasses is to draw a circle and mark the circumference off into its 6 parts by the radius length. Following this, we need but to reflect that the moon's mean diameter

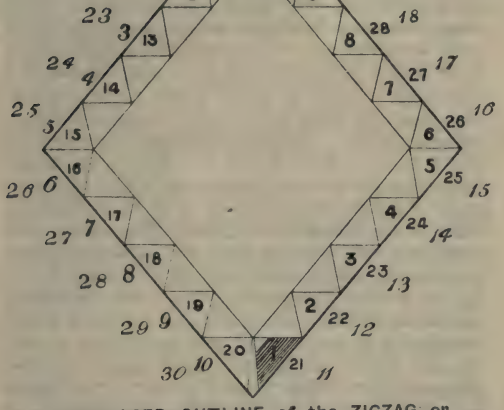
(½ degree) is practically ⅛th of the 3° sky-curve range of elevations between those locations, to indicate the Druidical line of reasoning out the apparent periodical movements, first of the easier traced moon, and later the most intricate sun's course, which could be only crudely traced by graduated shadows, but required most carefully recorded sightings by a gauge fixed at a great height, to register the varying Sun Elevations for more closely determining the yearly period.

As I returned from Silbury Hill, on January 20th, 1900, news arrived of the death of that eminent man of letters and worker for mankind, Mr. John Ruskin, which reminded me that he had so truly pointed out that an elementary knowledge of geometry was a first necessity for primitive men, and was inevitably developed before either writing or reading.

With the forked branch of a tree the savage draws circles and lines, accordingly, we find that Druidical records and ornaments were limited to the use of the circle and straight lines —mostly triangles—just as were found to be the significant scrolls upon the inner walls of the Great Pyramid.

Before I knew anything of Druid relics, it appeared evident that their Almanac for showing the progress of the Year would be arranged *to work round*, to show the Seasons—probably in the *form of a circle*, or possibly a square.

But the Rhomboid form previously shown is seen to be more suitable than either, and more truly represents the Seasonal Elevations of the Sun.



CORRECTED OUTLINE of the ZIGZAG or TRIANGULAR MARKINGS upon the STONEHENGE GOLD "BREAST-PLATE."

The above represents the lines really worked upon this Gold Almanac as actually used by the Druids, to which have been added the numbers and shaded outline of Silbury Hill in triangle 1, in order to explain my view.

The Sun, as viewed from the North of Silbury Hill, passes from the left (East) over the top to the right (West).—Therefore, taking its daily course as viewed at that observatory to represent one day, we read the triangles (typifying Silbury Hill) as the days of this "Perpetual Monthly Calendar" of 30 day months, which, as shown by the respective 30 plain and italic numbers, alternately begin at its lower and upper points, where the Solstice adjustments of the probable ¼ moon Perpetual Yearly Almanac would later be made, in accordance with the earliest habit of continuously counting the 30 days' months by alternate endings at fingers and toes.

From this, we may see how the native conservancy of men would lead them to adopt this *simple style of record for developing* their regular 30 days' monthly Calendar in daily units, before their crude, erratic, original "Year" Almanac was invented.—The latter would almost certainly be arranged to fit the *quarter-moon gradations*, which we know appealed most powerfully to the earliest men before regular records were kept.

Whilst the 6-tier "Year" style Almanac could reasonably be adjusted in days to their length of Year, the 29·53 days' moon (month) period could not be so made to fit in day units with the inevitably earlier recorded course of the Moon, which varies from day to day in its time of rising at any given meridian.

If the lunar period had been exactly 30 days, then 15 triangles (days) up each half would have given a perfect perpetual monthly Calendar which the full Moon would crown each month, but obviously it was utterly impracticable to scheme or make a fixed month in days accord with the Moon's fractional 29·53 days' lunation; hence, as social needs advanced with the growing civilization, the months must later have been recorded in day units and therefore inevitably have their Moon periods matured in different parts of consecutively tabled months. To avoid that the Druids would adopt the simplest month of 30 days arranged upon this plainest of Calendars, which kept the units of each date (1, 2, 3, 4, 5, 6, 7, 8, 9, 0) fixed in accordance with their *fives* system of counting, and also caused the *odd*-numbered months to alternately end at the top of the figure, whilst the intervening *even*-numbered month-ends finished at the lower angle when numbered in days at 30 per month, as shown by the *inner* plain and *outer* italic figures respectively.—This would prove a valuable counting means to facilitate the growth of Time records from the lunar month to the *Solar Year basis*.

Fuller consideration of this matter inclines me to think that this 5-tier Moon Almanac is of even earlier date than the expected 6-tier Sun Almanac would be.

Probably it marks the fixed 30 days' month stage of development between the first erratic moon records, and the growth of the Druidical ideas of time to the great year-unit when regular checks upon the yearly record of days became essential.—Possibly this gold symbol, so significantly found at the sacred central station of the Druids, and conspicuously placed upon the breast of the noblest of their order there buried, may have been actually used in the Druidical Councils for that great year-finding work which called forth and united the highest Ancient British efforts.

The British Standard Yard is wisely preserved by Parliament from actual use, and only copies are furnished for trading purposes. Similarly this *Standard* Gold Almanac, so highly prized by the Druids, would naturally be conserved under the charge of the Arch-Druids for academic reference, *whilst copies in wood* (probably marked by holes and worked by pegs, like the old games of "Merrells," "Fox and Geese," etc., are still played by our agricultural labourers) *would most likely be used for the actual counting in the various districts.*

The wood of such Calendars would of course perish in a few centuries, hence we can hardly hope to be able to verify that point and thereby absolutely establish the use, which admittedly is not yet conclusively proved—though the former wide-spread British and European use of wooden Almanacs indirectly supports that view.

From the foregoing data and arguments, I urge that this diamond-shaped gold breast-plate was the *Standard* Almanac probably of one of the most eminent Arch-Druids, who, having invented it, wore it on high occasions, hence it was reverently laid upon his breast for "the last long sleep," as the highest mark of esteem in those early times.

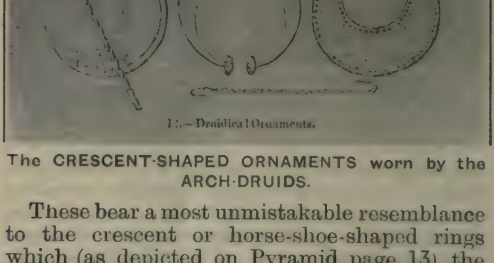
Though unable to find any prior interpretations given to this plate, I submit that this solution seems reasonable and probable, for the gold is typical of the apparent colour of the Sun and Moon.

From these considerations, I submit that this gold "breast-plate" may be taken as a specimen of the second (monthly) stage of the early British Calendar, which was probably followed by an imperfect Yearly Almanac of 6 monthly Elevations, as first shown herein, from page 182 of Mr. Long's "Stonehenge," and that for a considerable period those two styles would be used conjointly—the 5 triangle-sided one being used for the month, whilst the 6 triangle-sided one in ¼ moon gradations would be used for the 12 months' Year, as the first practical comparative basis of "Time."

This seems the farthest back we are likely to trace in early Almanac research within the British Isles, and possibly in Europe. Possibly the 13 amber beads (also the colour of the Sun and Moon), found at Lake, in Wiltshire, betoken the inevitable early and probably short-lived struggle between the advocates of the Year of 12 lunar months as against the 13 which would arise in some minds, because the 12½ lunations of the true Year inclined after each few years to support the idea of 13 months, especially when unseasonable weather prevailed, as it so often does in the British Isles.

Our compensation for that apparent "testing weather" disadvantage seems to be that this trying climate so physically hardens our constitutions, that Britons are able to withstand the rigours and strains of almost any climate in the world.

This reference to Druidical methods of tracing out and recording the Seasons and Year is hardly complete without drawing attention to the following illustration of



13.—Druidical Ornaments.

The CRESCENT-SHAPED ORNAMENTS worn by the ARCH-DRUIDS.

These bear a most unmistakable resemblance to the crescent or horse-shoe-shaped rings which (as depicted on Pyramid page 13), the Egyptian King and Queen were handing out as *tokens of Wisdom*. We can hardly fail to see that they are all patterns or emblems of that *crescent zone* within which alone can be traced the Sun's apparent Yearly path along the celestial arch, as outlined in "6 monthly arches of Elevations," on page 16.—Observations of the Sun within that zone (which appeared nearly the same in size and form all the world over), revealed the Year's term as the highest and most practical wisdom to men, and therefore it was thus naturally typified by the Egyptian leaders as the emblem of wisdom.

The illustrations of Druids on page 317, show this symbolic *zone* as both held in the hand as an emblem or instrument, as well as crowning the Arch-Druid's head and worn as a "Breast-plate."—The latter seems to show the "6 monthly arches of Elevation," which are also indicated by the 6 arches of the right-hand ornament above, as denoted by "tally-like" scores or markings thereon.

MAES-HOWE of STENNESS, on the MAINLAND of the ORKNEY ISLANDS, North of SCOTLAND.

Mr. Magnus Spence, per his "Standing Stones and Maes-howe of Stenness," published by Alexander Gardner, of Paisley and London, rightly says that "Maes-howe is the principal "Chambered Mound in Western Europe. Only "three others approach it in size, and are some-"what similar in design and construction. These "are New Grange and Douth, on the Boyne (in "Ireland), and Gavr Innis in Brittany."

Like Silbury, Marlborough and other Ancient Observatory Mounds, the above have been so long erroneously regarded as Burial Mounds that many people will find it difficult to break from that sepulchral idea, though no traces of burials have been found in them.

"Maes-howe demands a word in parting "from its old traditions of darkness, to take "its legitimate place as the Observatory of the "Prince of Light (Sun) and the heavenly hosts, "instead of being the ghastly receptacle and "charnel house of the dead; to be the palace "of the Arch-Priest of Belus instead of the "prison of death.

"Maes-howe may have been, as other mounds "were, desecrated, and to some extent demolished "in order that the spell, which fascinated the "Orcadian Sun-worshippers to their ancient "temple, might be weakened and possibly "destroyed." Indeed, we know that "during "the 11th and 12th centuries, the predatory "Norsemen occasionally resorted to it, and "inscribed those Runic sentences upon its walls, "which have considerably increased its interest." They may be traced on the illustration of the interior as cut-lines up the edges of the pillars and on the side slabs.

"The entrance to Maes-howe opens to the "South-West; in marked contrast to the burial "airns in the neighbourhood, such as Unstan "and Barnhouse, where the passages open "to the East and the rising Sun, the sustainer "and vivifier of all creation—a true emblem "of resurrection."

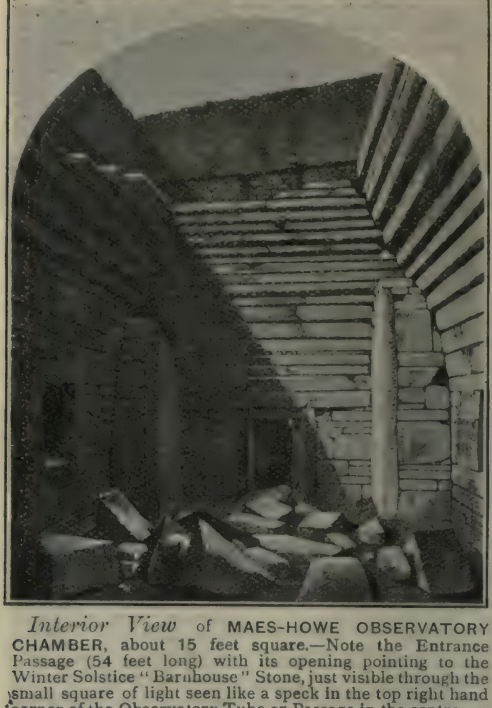
The entrance passage is 54 feet long, 3 feet wide and 4½ feet high, but at the entrance is contracted to 2½ feet × 4 feet.

When opened by Mr. James Farrar, M.P., in 1861, there was a still further contracted passage, which left only a very small opening.

On looking from the central chamber through that long passage as an "Observatory Tube," the view is restricted to a narrow strip of landscape, and it is very significant that "*in the centre of this contracted view, and at a "distance of 42 chains stands the monolith Barn-"house,* one of the most conspicuous of the few "outstanding menhirs (also called monoliths or "obelisks) not embraced in the circles.

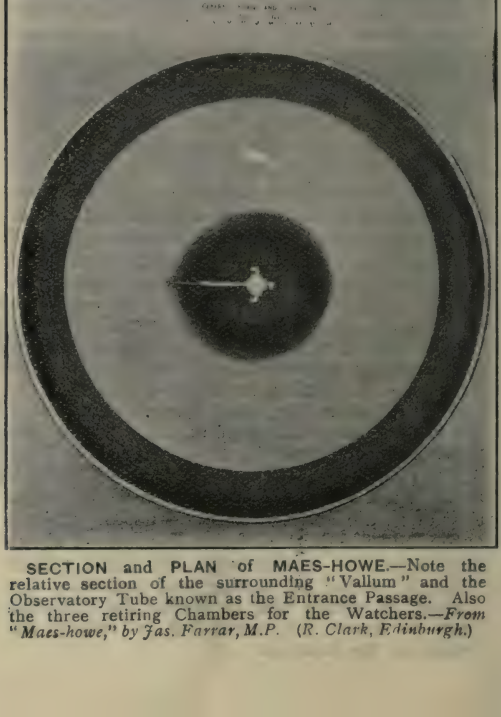
"The straight line thus formed points in a "South-Westerly direction to the point where "the Sun sets some 10 DAYS BEFORE THE "WINTER SOLSTICE."

Mr. Magnus Spence then proceeds to argue that our Yule Feast as a relic of Sun-worship extended to 14 days, and that the Sunset about December 12th would begin the Feast which "was a period of fasting and sacrifice, the "object of which was to invoke the *Sun*-God "not to desert the world, but to retrace his "steps in the heavens"



Interior View of MAES-HOWE OBSERVATORY CHAMBER, about 15 feet square.—Note the Entrance Passage (54 feet long) with its opening pointing to the Winter Solstice "Barnhouse" Stone, just visible through the small square of light seen like a speck in the top right hand corner of the Observatory Tube or Passage in the centre.

The Runic letters on the pillars and slabs closely resemble the moon-mark signs down the edges of the "Clog Almanac."



SECTION and PLAN of MAES-HOWE.—Note the relative section of the surrounding "Vallum" and the Observatory Tube known as the Entrance Passage. Also the three retiring Chambers for the Watchers.—*From "Maes-howe," by Jas. Farrar, M.P.* (*R. Clark, Edinburgh.*)

The latter clause appears reliable, but I cannot believe that the wily priests would have endangered their craft by beginning their invocations 10 days *before* the Sun appeared to turn from its lowest course, as then their devotees would have doubted priestly power.

I submit that they would obviously begin their incantations *at* the Winter Solstice (December 22nd) or not more than a day or two before, as the object of the knowing priests would be to demonstrate to the assembled people that the Yule fires, sacrifices and prayers of the priesthood could induce the Sun-God not to proceed further on his downward course, but to retrace his daily cycles upwards to renew light, warmth and life to all Nature, which appeared to be falling under the powers of darkness and the chilling blast of Mid-Winter.

To have begun their prayers whilst the Sun daily continued to descend to Yuletide (December 22nd) would have made sceptics scoff and have exposed that stratagem by which the priests maintained their easy life, governing power and influence over the people.

Their policy was to impress their congregations with the idea that the contributions which the people brought, enabled the priesthood to minister to the Sun-God (variously called Apollo, Baal, Belus, etc.) to propitiate the sins of the congregation, and that because of the sacrifices, prayers and priestly ministrations, the Sun-God relented and turned to progress upwards from the time of their great united service at Yuletide (December 22nd).

Therefore when Mr. Magnus Spence, on page 6 of his pamphlet, distinctly shows that **"THE SUN SETS SOME 10 DAYS BEFORE "THE WINTER SOLSTICE"** in that fixed sighting-line from the Observatory tube across the top of the Standing Stone of Barnhouse, it seems reasonable to conclude that there has been about 10 days change in the Yuletide (Winter Solstice) setting of the Sun since the erection of this Maes-howe Observatory.

That 10 days' change requires more than the "Precession of the Equinoxes" to explain it, and appears to further evidence that Changing Latitude which seems proved by the precession of the Great Pyramid's shadow by 18 days (March 21 — 3), as per pyramid page 78-a, and discussed at the end of the pyramid section.

We should remember that Mr. Magnus Spence lived many years as Head-Master of the Stenness Public School, adjoining Maeshowe, where he not only had abundant opportunity to take observations, but also had the keen and intelligent interest in that Ancient Observatory, hence we may rely upon his statements and measurements which provide further interesting results as follows:—

The significance of the name and situation of the Western monolith, known as the *Watchstone*, at the Bridge of Brodgar, appears evident, as looking Westward from the Maeshowe entrance across the *Watchstone* the ancient observers evidently watched the setting Sun at the Equinoxes on March 21st and September 23rd.

I have already shown by the York Minster diagram, on page 154-h, how the other Seasonal points could be defined. That may enable interested readers to understand Mr. Magnus Spence's diagram next reproduced, as the Sun's "Amplitudes" wherever registered by the Sunrise and Sunset points as viewed from any central point on the Earth, always appear to cross through that point by direct lines from the Mid-Summer Sunrise to the Mid-Winter Sunset, and from the Mid-Winter Sunrise at an equal angle to the Mid-Summer Sunset, the only difference in the range of that "Amplitude" measured between the extreme Solstices at Sunrise or Sunset being that they appear wider apart as the Latitudes increase beyond the Tropics.

Beyond those sectors, the due East-line marked the Equinoxial Sunrise, and the due West-line the Equinoxial Sunset, whilst the meridian-line crossed the Equinoxial-line at right angles, forming not only the South-line indicating noon, and the North-line to the Pole at Midnight, but also registering the Quadrants of the Circle within which the Amplitude Sectors were more readily marked along the encircling natural pointed stones thus first suggested as a most convenient means for recording public Almanac and Daily Times whilst forming a rational centre for Public Instruction, the National Administration of Justice, Promulgation of Laws, Acts of Government, Public Assemblies, Festivals, etc.

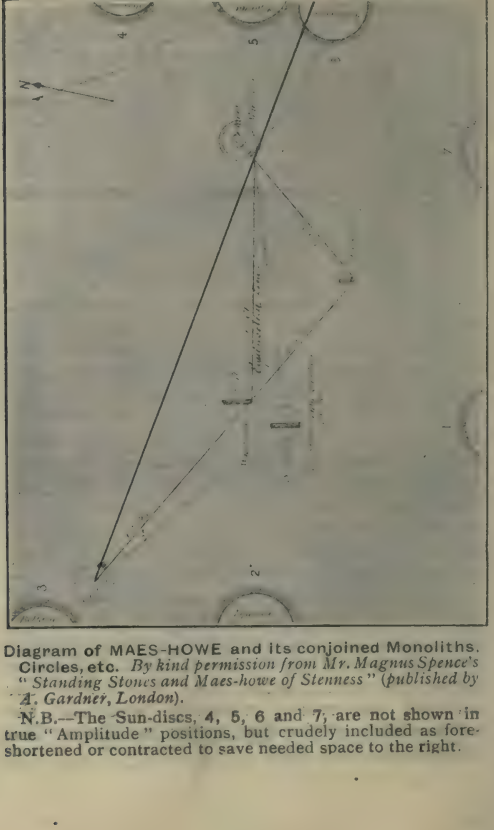


Diagram of MAES-HOWE and its conjoined Monoliths. Circles, etc. *By kind permission from Mr. Magnus Spence's "Standing Stones and Maes-howe of Stenness" (published by A. Gardner, London).*

N.B.—The Sun-discs, 4, 5, 6 and 7, are not shown in true "Amplitude" positions, but crudely included as foreshortened or contracted to save needed space to the right.

The correct alignment and very remarkable geometric ratios displayed by this diagram prove that the Ancient Britons had attained to much higher knowledge than has been generally credited to them.

That appears evident from the fact that exact mathematical ratios of distance exist between each of those monoliths which were carefully erected to mark the essential points of Seasonal Observation when viewed from their respective counterparts and the conjoined Sun and Moon circles, as well as the chief Observatory Mound centered in the wonderful Maes-howe.

Those ratios may be clearly discerned from the following comparative distances when read in pairs in connection with the diagram: -

From Maes-howe to the Winter Solstice Stone at "Barnhouse" is	42	Chains
From "Barnhouse" to the Equinoxial "Watch-Stone" the distance is also	42	,,
The base of the Isosceles Triangle forming the Equinoxial Line from Maes-howe to the "Watch-Stone" is	63	,,
That latter line again forms one side of the larger triangulation, as it pairs with the corresponding distance of from the "Watch-Stone" to the centre of the Moon Circle, which terminates the base line of that larger Isosceles Triangle completed by the direct Sighting-Line from Maes-howe to the "Beltane" Sunset on May 1st, at a distance of	63	,,
The Check Sighting-Line directed by the Barnhouse and Watch Stones enabled precise "Beltane" Sunset observations to be taken as it cuts the Maes-howe line off at exactly	79	,,
The heavy line extends Westwards from Maes-howe, to mark at Sunrise the Ancient Festival of Halloween, by the Standing Stone at Cairston, which, in direct line, is thus distant from the Moon Circle's centre	158	,,

Probably there was formerly another monolith marking Mid-Summer in the direction of Sunrise at the *Summer Solstice*. That may have been removed during past ages, but so long as the Barnhouse stone remains the corresponding angle from the Equinoxial Line will show the *Summer Solstice* point, therefore this Ancient Observatory appears practically complete for locating the Seasons by the Ancient "Amplitude" methods of observing the Sunrise and Sunset.

We know from tradition and customs continued down to recent years, that the Ancient Britons celebrated the *Summer Solstice* by fire Festivals flashed from Beaconed Hills. Further, Colonel Leslie states. "that at this "period (Mid-Summer) a wheel covered and "twisted with straw used to be taken up the "nearest hill-side and set on fire, and then "rolled down to represent the Sun in his "receding course."

The Maes-howe Chambered Mound, near Stenness, Orkney Isles, from the North-East, showing the circular track or Vallum round the Mound, which is 36 feet high, 92 feet in diameter, and about 300 feet in circumference.

"MAES-HOWE," the largest Chambered European Mound, near Stenness, Orkney Isles, from the NORTH-EAST.
From "Maes-howe," by Jas. Farrar, M.P. Published by R. & R. Clark, Edinburgh.

Note the Stones of the Stenness Circle on the promontory to the right, and the "Watch-stone" Monolith erect near the Bridge of Brodgar, also the twin stones to the left thereof.

The original truncated top was level, to fix thereon the "Maypole" or "Flag-staff" as the Scottish proprietors or "Lairds" still do when "in residence." Part of the top has fallen in, as already shown by the interior view, hence the present broken and misleading slope of the Mound's top.

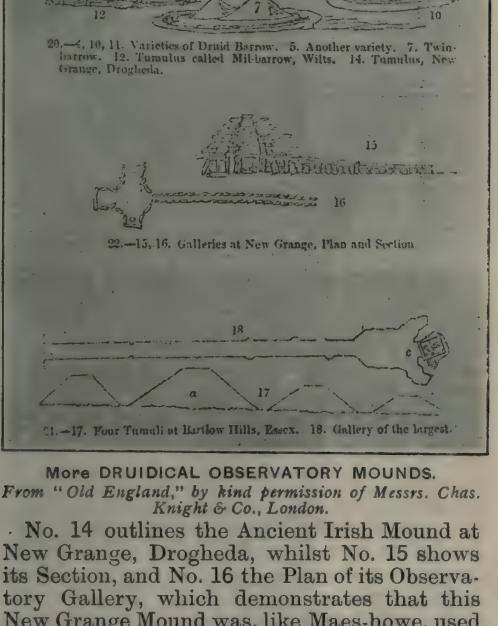
As further evidencing the astronomical knowledge of those early Observers, we note the significant fact that taking the base-line from Maes-howe to the Moon Circle, the inner triangle with its Apex at the Watchstone has an angle 5° less than the outer triangle having its Apex at the stone in the centre of the Sun Circle.

That 5° Mr. Spence thinks, with fair reason, is a measure of the 5° Amplitude width of the Moon's course across the heavens, from the celestial Tropics bounding the Sun's apparent course.

Further, the Moon Circle "has a diameter "of 116 feet, which gives a circumference of "365 feet, the exact diameter of the Sun "Circle,"—a remarkable fact when we remember the 365 days in the ordinary year.

Therefore it is evident that the Druids understood observations not only by circles but also by the larger and truer triangulations.

Several other confirmatory astronomical points might be named, such as the further 42 chains distance between the Sun Circle's outpost and the twin Monoliths near the Bridge of Brodgar, and the "Stone of Odin," which existed up to about 80 years ago, with its circular *sighting hole* similar to that already shown for the Cornwall "Stone of Constantine."

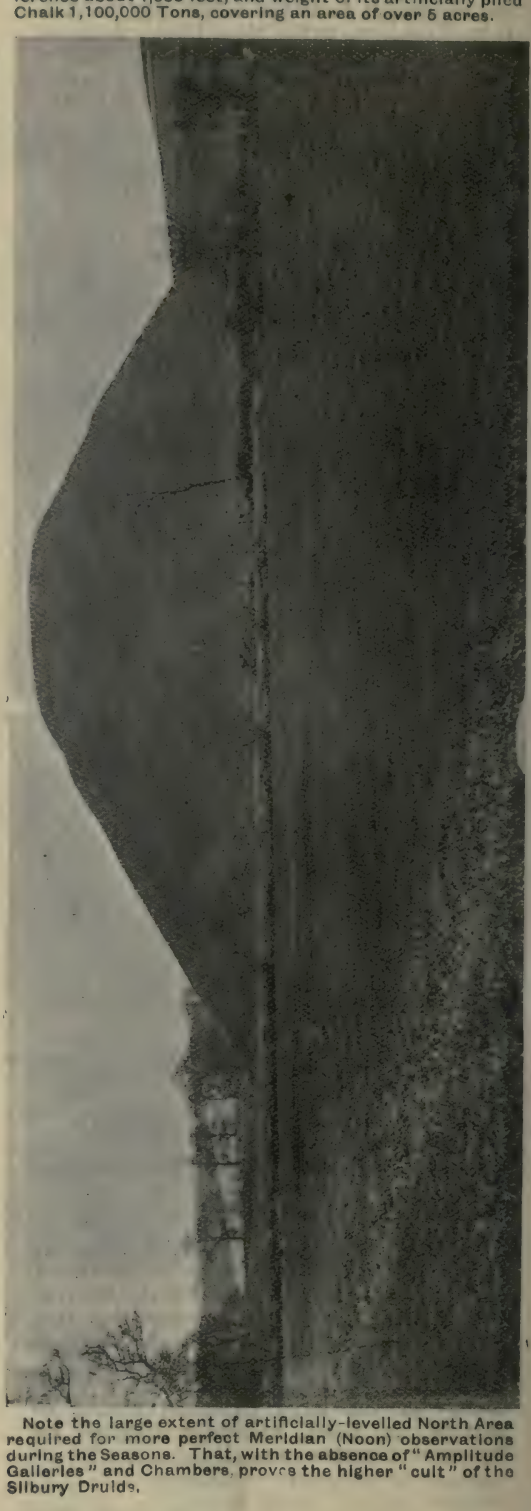


More DRUIDICAL OBSERVATORY MOUNDS.
From "Old England," by kind permission of Messrs. Chas. Knight & Co., London.

No. 14 outlines the Ancient Irish Mound at New Grange, Drogheda, whilst No. 15 shows its Section, and No. 16 the Plan of its Observatory Gallery, which demonstrates that this New Grange Mound was, like Maes-howe, used to locate the Seasons for Almanac purposes.

Similarly No. 18 shows the Observatory Gallery of the large Druidical Mound at Bartlow, in Essex, evidently designed for the same Almanac use.

SILBURY HILL, in Wiltshire (ENGLAND), is the LARGEST ARTIFICIAL MOUND in EUROPE. Height 130 feet, circumference about 1,633 feet, and weight of its artificially piled Chalk 1,100,000 Tons, covering an area of over 5 acres.



The Speck on the top of the Hill is a man standing upon a chair. The top of the Sarcen-stone unearthed is shown mid-way along the lower edge of the picture.

Note the large extent of artificially-levelled North Area required for more perfect Meridian (Noon) observations during the Seasons. That, with the absence of "Amplitude Galleries" and Chambers, proves the higher "cult" of the Silbury Druids.

This View from the North Meridian Point, where the top of the unearthed Sarcen Srone appears in front, shows the vast levelled North Observatory Area which was unbroken until the recently formed bye-road and hedges were formed across it. Note about 20 feet from the top of the Hill the encircling Vallum-like "May-walk," which appears to have been used as a Vallum on Festival occasions, such as dances round the May-Pole (probably then centered on the Hill in full view of the assembled people). The Hill was too high for a ground-level Vallum to be used as at Mears-hower

So we might go on to show how other ancient land-marks such as the spirally-terraced Herefordshire Beacon, "Old Sarum" in Wiltshire, the Scottish Mound at Dumbarton, etc., were located for directing public convenience, and were probably used to observe the Seasons and register Almanac dates for their respective districts long before printed or written Almanacs or even the Runic "Clog Almanacs" came into general use.

Sufficient of this independent evidence has, I trust, been shown to prove the Almanac or year recording purpose of Maes-howe, when considered in the light of similar facts disclosed by the Summer Solstice sighting across the Friar's Heel at Stonehenge, and the like Solstice Stones at Crichie, in Aberdeenshire; Leath Brock, near Dunrobin, in Sutherlandshire, as made clear by Dr. Wise and others.

It may, however, here be convenient to refer to the use of those circular hollows which surround the Maes-howe Hill in its exterior illustration, and are seen round Stonehenge, etc., as well as the numerous smaller mounds termed "Barrows," which are found near the sites of the Ancient Druid Observatories.

"According to Colonel Leslie, on Beltane "(May 1st) and Mid-Summer Days, those on "whom the dire hand of disease had fallen, "or those desirous of averting that calamity, "went seven times round the Sacred Wells, "Sunwise (deasil), and then proceeded to the "'circles,' where a like ceremony was performed."

The corresponding Scottish custom of tramping round the "Fairy Circle" at "Hallowe'en" seems traceable from Druidical Times.

Sir Norman Lockyer has, by articles which have appeared in *Nature*, etc., shown the wide-spread use of the "Farmers' Year" in ancient times through Egypt, Asia, Europe, etc. He there rightly emphasized the fact of great "Beltane Festival," which still survives in our MAY-DAY celebrations, with that favourite jolly and significant Maypole Dance.

The plaiting of the Maypole, with the gay tripping dancers circling round, inclines me to believe that the picturesque ceremony has been handed down to us through past ages, from the time when the Ancient Britons assembled on May 1st with their Maypoles crowning their Mounds, and their jovial young people pacing round the Vallums with loose ends of May-Ribbons or Strings in their hands whilst the other ends were tethered to the pole's top. Then as the plaiting began to reduce the diameter of their tramping path, it caused them to cycle screw-like up the Mounds as their ropes or ribbons shortened.

That I think is indicated by the depressed ring which circles the upper part of "Silbury Hill" about 20 feet from the top, as seen in the last picture, for it forms a reasonable "Maying Path," and appropriately begins about where the "May-Day" Sighting point would mark the Meridian Elevation of the Sun disced on the pole then centred on the top of Silbury Hill.

From Pre-historic Times right down to the Commonwealth period the merry customs of May-day brought happiness and joy into country life, when, according to ancient custom, *all ranks* of the people rose at early dawn and went out "a-Maying" to welcome the return of Spring.—Much of the jovial happiness of village life in the reigns of the Henrys and Queen Elizabeth was due to the freedom with which those merry Festivals were held.

That early assemblage of the people keeping Festive Holiday sanctioned by the presence of the priests marching on May morning in procession to neighbouring woods, returned in triumph with the Maypole, round which they suspended flowers, boughs and other tokens of Spring, as indicated by the May-Day "branch sign" upon the "Clog Almanacs."

"The last Maypole erected in London was
"100 feet in height, on the spot where the
"church in the Strand now stands, near Somerset
"House. Being taken down in 1717-18, it
"was conveyed to Wanstead Park, in Essex,
"where it was fixed as part of the support of
"a large telescope, set up by Sir Isaac Newton."—
Ex "Encyclopædia Britannica," Vol. XV., page 648-a.

"In England the beautiful custom of the
"Maypole, with its tall garlanded and decorated
"shaft (stowed away the rest of the year under
"the eaves of the houses, upon hooks), and set
"up on May-Day, was never omitted in the
"Middle Ages. The Puritans, to whom we
"owe the loss of so many of our public games,
"and so much of our merriment, ordered all
"Maypoles to be destroyed by Act of Parliament
"in 1644, as 'a heathenish vanity, abused to
"superstition and wickedness,' and fined the
"constables five shillings weekly as long as
"they stood. Morris-dancing, masquerading,
"mock tournaments with hobby-horses, and
"the more orderly dancing of youths and
"maidens all centred round the Maypole of
"the parish on May-Day."—
Ex "National Encyclopædia," Vol. IX., page 170.

Those Festivities which clustered around the Almanac during the Early and Middle Ages had more to do with the happiness of the people than the extreme Puritans imagined when they pulled down the Maypoles and suppressed many of the innocent and helpful customs which would have retained brighter life in our villages and maintained more vigorous national life.

Healthy exhilarating customs help to strengthen nations far more than most people imagine, and should be cultivated as National Assets, as they were by former Sovereigns such as Queen Elizabeth, who induced the leaders in Country life to contribute their best, with the result that the Golden Age in British History followed in Literature, Art, and the rational employment of the people in useful work, by happier methods than much of the present day materialistic developments afford in modern industrialism.

Think of what we have lost by Puritanism and industrialism being then carried too far.

How rarely do the Lords and Ladies of the Manors and Country Squires with their Families contribute a tithe of what should be their quota to the jollities and happiness of village life?

The noble-minded common-sense free and generous leaders of that village life which in former times was the crowning glory of England (when villagers almost worshipped the kindly souls who rose to their responsibilities), have too often been succeeded by people who fail to command respect, because they have fallen victims to the accursed selfishness, overweening pride, and Class Interests which unfortunately result from our too exclusive University system fostering privilege, instead of giving free opportunity to cultivate all that is best in British National life, which of necessity must be founded upon the highest type of healthy Country life.

Surely History and our own experience prove that healthy robust life under ideal social arrangements could best be developed in our British Villages, if Society people would reasonably carry out their responsibilities to their families, fellow-citizens and the State.

Let those who suffer from ennui in our cities try Nature's tonic of useful and interesting aid to village life. Let them erect Maypoles in neighbouring villages, train the children in pretty rhymes to dance and tune; then young men and maidens will grow up graceful, sweet-mannered and considerate, helped by tripping round the Maypole and joining in the merry Country Dances, Songs and Jollities which used to make life in our villages the best worth living. Those naturally-developed dances, with hearts attuned by hearty songs in which all gleefully unite as villagers can, will beat all the Waltzes, "Washington Posts," and social crazes, for giving real life, recreative energy, and happiness to the home and social life of the people.

They have always proved healthy and invigorating, far beyond the tame "private theatricals," or close and over-done theatres, and could be made far more useful than theatres and music-halls combined if they were suitably varied by good readings, recitations, band and choral contests, sports, etc., between neighbouring villages and towns.

I suggest that Village Schools might thus be put to better uses than the Churches, if a "social evening" was given each week for young people, another to include older people, with Choral, Band, Debate and Game evenings varied, in which all creeds could heartily unite.

Let the ladies and gentry, as of old, grace those proceedings and not be above taking the parts they are suited for in the choral and glee parties, blind man's buff, the tug-of-war, or laughing at the children "bobbing" for apples at "Hallowe'en," or yet the rustic antics on Plough Monday, or the "Mummers' Charades" towards Christmas, then they will find that those old Almanac Festivals bring renewed life and arouse interest in Nature's sweetest way, drawing out the best for all.

Very much more of social realities than appears on the surface hung round the helpful Festival traditions of the Old Almanacs, which were intended to promote the highest life by natural means, and had such great influence upon everyday life, that when they were allowed to lapse some of the best charms of Country life vanished with them, and as the interest waned the trend to Town life grew with its accumulating dangers, as now experienced by the unnatural lives there developing in increasing proportions.

A glance at the Festival signs upon the "Clog Almanacs" already illustrated manifests the helpful influence of those Festivals and Holidays upon the people who cherished those recreative relaxations as valuable additions brought round by their Almanacs, which though primarily designed to locate the Seasons and ensure food by timely sowing seeds and directing Agricultural operations, gradually had their uses extended to all those ever-increasing purposes to which we apply Almanacs in our everyday life, in all its phases of National, Municipal, Business, Social, Legal, Church, School, Meeting, Feast, Festival, etc., arrangements, needing constant reference to the present erratic and irrational Almanacs.

Those and many other conveniences would be jumbled and unworkable, entailing serious loss and trouble, until our Almanacs (which we now think so lightly of) were developed by those long and laborious stages now evident from the explanations already given of the building and purposes of the Pyramids and Druidical Observatories like Stonehenge, Avebury, Silbury Hill, Maes-howe, etc.

Thus we may conclude that our early Ancestors who erected these Observatories for Almanac purposes thousands of years ago, deserve our admiration for their mathematical and astronomical knowledge so laboriously gained for the highest national object of ensuring food by sowing, etc., at right Seasons.

Their object was thus worthy of those stupendous exertions by which they overcame almost insuperable obstacles. Their physique and standard of civilisation must have been advanced far beyond that barbaric state commonly attributed to them. They must have lived in communities and worked unitedly for the welfare of their race; therefore we should respect them and revere their works.

Seeing that they toiled so nobly for their crude Almanac registers, may we not ask ourselves how far our civilisation has fallen short in allowing our present anomalous Calendar to remain almost as it was in Julius Cæsar's time—1,950 years ago? Should we not try to perfect it now, when we can so easily do so?

Will you try to further this reform to save yourself and everyone else those constantly repeated references to Almanacs and the inconveniences which result from drifting Easters, etc., and thereby gain those real advantages to business and social life which are indicated more particularly in the Almanac Section?

SUMMATION.

During the 19th Century, growing knowledge of the living conditions which controlled our Ancestors, has been so far extended backwards through Early Historic Times, to Ancient, Pre-historic, and even those Geological Times known as the Glacial and Tertiary Periods, that reasoning minds feel bound to accept the unmistakable increasing evidences of Anthropologists, Archæologists, Geologists and other investigators, who have so distinctly demonstrated the great Antiquity of Man.

Men cannot disbelieve those convincing proofs which are disclosed before their eyes; therefore the pre-conceived notions which led some of the earlier Bible translators to erroneously limit the past history of mankind to about 6,000 years, has to give place to the greater unfolding of the illimitable past through which bounteous Nature has been evolving mankind to higher ideals, amidst those resultant ebbs and flows of racial wars and national vitality which we vaguely characterise as variant civilizations, though we tend increasingly to realize how gradually they acted and re-acted upon each other during former contemporary periods as now.

Our immediate ancestors were too ready to believe that Ancient races were uncivilized, and that all pre-historic men were savages.

Undue weight was given to the rare finding of fractured pre-historic skulls, such as the one in which the stone axe was found embedded in the cranium—oblivious of the fact that wars still rage, and broken heads have possibly been more plentiful in Historic than Pre-historic Times, as appears likely enough when we remember that during the recent battle of Sha-ho the Russian and Japanese killed and wounded numbered about 100,000.

But for historic records, the people living 1,000 years hence on finding such remains might readily conclude that we were barbarians.

So it seems to have been in the past.

Wars are painful incidents in the struggle of humanity, hugely magnified by the very dread of their countless dead; but they do not proportionately evidence the great peaceful evolution of human thought and progressive development in the social arts of Agriculture, Building, Clothing, Transport, etc., upon which true progress depends.

The evidences of the Sphinx, Pyramids, Obelisks, Temples, Vertical Stones, Druidical Circles, Artificial Mounds, etc., as herein disclosed, to my mind furnish far more instructive object lessons in human progress, and clearly demonstrate higher thinking capacities, more rational purposes, and more united applications in a good cause, than has hitherto been attributed to pre-historic peoples.

Though some savages existed then as now, probably few were as degraded as many of the criminals and vicious characters now bred in the great cities of the New as well as the Old World.

The Goths and Visigoths, whom the degenerating *city-reared* Romans could not withstand, were as naturally dubbed "barbarians" in the Roman records, as was the Mullah in Somaliland, whom the British newspapers called "Mad" when he was sensibly defending his country, as their readers would have done; yet we may reasonably doubt whether, considering their opportunities, they were as bad as some of the "hooligans" of London or the ruffians who terrorise Chicago.

The Goths and other early races were humanised by communion with Nature as they watched their flocks and herds. Their leaders were hardy, brave, heroic men, who personally defended their wives, children and homes they held dear, against the growing oppression of the Romans, who sought to exact more taxes and to maintain the growing luxury and licentious life too often developed in their cities, as Pompeii so terribly demonstrates.

The Roman Rulers had degenerated from the nobler Antonine and Diocletian type, to exacting creatures like Nero and such crafty selfish men as are now represented by the American Trust Builders, Morgan, Rockefeller, etc., who plot to take a mean advantage of their poorer fellow-men, instead of applying their gold and power according to the golden rule of "doing unto others as they would that men should do unto them."

The stalwart Goths would not longer bear the encroachments of the wealth-seeking Romans, and rightly hurled them from power.

By that the Goths proved themselves to be true men of grit and discernment, disciplined and capable of united action for a noble purpose—and not the barbarians they were represented to be.

Similarly William the Conqueror found the Britons, led by Harold, to be earnest men, willing to defend their homes with their own lives, not content to hide behind hired mercenaries.

The earlier Britons under good King Alfred probably led a far happier and more natural life than thousands in our huge cities, and certain it is that Alfred was a far nobler and more useful man than the Trust Builders and schemers such as Whittaker Wright, Hooley and others produced (we may almost say characteristically) by this "Money-grubbing Age," when the greed for money and rush for pleasure is crushing out those truer joys of happy home and social life which are best developed by simple living under the healthy and more natural conditions of freer open-air life in communion with Nature.

The Ancient Greeks and Romans of 2–3,000 years ago would never have tolerated such scheming selfish men, not even when they act as hosts to an Archbishop, or conduct a Sunday School, still less would they ever have been so supine or forgetful of the rights of the toiling masses with their women and children as to let the machinery of Commerce and Government get into such hands to endanger the welfare of the people.

Would not the Greek Socrates and Roman Cicero have pointed the finger of scorn at our vaunted civilization of 2,000 years later (despite all its advantages), which so foolishly awards the public prizes of life to self-seeking and grasping men who take advantage of their fellows, whom they hem within our great cities by holding land for high values, hunger and starve by making "Corners" in food stuffs, cotton, etc., to further enrich themselves by impoverishing the helpless poor?

Would worthies like Socrates and Cicero have been content to pour contempt and ridicule upon such men, and seek to protect them with our system of Lawyer-ridden Law, or the feeble punishment meted out by our Law Courts to such extortioners?

No! They would by their oratory have fired the people to work for truer liberty and establish a sounder basis of civilization, where all men should have equal rights and fair opportunities according to their abilities.

When we compare the high standard of Justice in Greek and Roman times with much of the present travesty of Justice called "Law" in the United States, and even in England find poor men are fined the same amount as richer men, to whom equivalent punishment would require 100 or even 1,000 times that value, whilst poor men are imprisoned for trivial offences, whereas fraudulent promoters live in parks and country seats like Lords, in defiance of the Law, after committing repeated frauds upon innocent people and appearing before successive Law Courts; we should feel humbled at the evils and impotence of much in our civilization, and be prepared to admit the good points developed by earlier races.

The just and equitable tribal system of land tenure in Ireland about the dawn of the Christian Era was better suited to develop the welfare and happiness of the people than many of the numerous Laws which have since been made.

Similarly there was much in the Mosaic Law of over 3,000 years ago regarding usury, the division of Lands, etc., which we hardly equal now in the letter of the Law, and are very far short in that spirit of justice which should exist between rich and poor.

The Roman conquerors of Britain found such stalwart men controlled by the educated Druids, that we have reason to attribute to them high powers of thought and organization for the united welfare of their people, even when we are only able about 4,000 years later to dimly discern some of the uses of their mighty works at Silbury Hill, Stonehenge, Maes-howe and other Druidical Observatory Temples.

The earliest records prove that the pre-historic men with whom historians came in contact were earnest and sensible worshippers of the bounteous natural forces which gave them life and being, and furnished them with all things needful for the full enjoyment of vigorous life.

When we think of pastoral men like Abraham, Jacob, Moses, David, etc., who have already influenced humanity for good through thousands of years, and will continue to do so centuries hence when we are forgotten, we should be willing to reflect that they *had time to think, and did think deeply about the great problems of their generations.* Further, they earnestly set about to solve them by practical means.

They did not look on with that cold calculating influence too often developed by the present University System, which leads our young graduates to look upon humanity as material to be manipulated and handicapped to ensure luxurious life to their privileged few.

They did not subject the higher interests of noble life and the happiness of their people to mere money-making, of which they knew the evil effects, neither did they nor the Ancient Druids discourage their students from human sympathies by teaching, as some professors so mistakenly do, that "this is not an ideal world "of men, and you can't make it so. Your policy "is to make the best of it for yourselves."

Such selfish teaching inculcates that selfishness which is becoming the curse of our age, and altogether misses what should be the main object of University training—that should aim at developing the highest ideals in life, and above all the noblest determination to use the best knowledge and attainments for the noblest work of doing all possible good unto all men.

The nobler spirit of the past taught the higher honour of unselfish efforts towards developing earnest men to work together daily to make the lives of their fellows better than they found them.

I believe that it was by that spirit of united effort for the good of all that the colossal Pyramids were built in Egypt, Babylonia, Mexico, etc., as also the cones of Peru, Rhodesia, etc., and the huge mounds like Silbury Hill, Maes-howe, etc., found through higher Latitudes, as well as the Druidical circles and vertical stones erected in various parts of the World.

All those appear to have originated in the natural desire to unitedly work for the good of their respective communities by erecting those Observatories to locate the Seasons and thereby find the length of the Year for the great Almanac purpose of showing when to sow, etc., to provide the food, etc., for the comfort of the people.

We not only have the writings of Julius Cæsar declaring the culture of the Druids, "but the language of other writers, Mela, "Diodorus, Siculus, and Ammianus Marcellinus, "would seem to imply that the Druids held "the doctrine of the immortality of the Soul as "resting upon a nobler principle," as the latter expressly states that they "believed in the "future existence of the spirit in another world."

"Diogenes Laertius wrote that their religion was "comprised in the three precepts—to worship God, "to do no evil, and to act with courage."

May we not rightly believe that the Druids thus trained their youths to grow up truly noble men, imbued with moral courage to maintain the right; whereas alas nowadays moral courage is too often discounted by undergraduates, who let wrong prevail and so by example undermine public moral courage which scarcely rises to 1% of men daring to keep a non-smoking railway compartment pure for even the comfort of the fair sex.

Julius Cæsar recorded that "*the Druids so "regulate their birthdays, and the beginning "of months and years, that the day shall "come after the night.*"

We have thus very definite evidence that the Druids kept such precise records of Time in Days, Months and Years as could only have been possible by means of regular observations of the Sun and Moon, at such Observatories as they erected at Stonehenge, Avebury, etc.

The particulars recorded and explained upon pages 290 and onwards will, I trust, suffice to satisfy readers of the utility of the Druidical Circles and Mounds, such as Silbury Hill, Maes-howe, etc., for Almanac purposes, to enable the people to conduct their Agricultural, Governmental, etc., operations with the greatest advantage to the community.

Thoughtful minds reading Julius Cæsar's description of the Druids as I have quoted under "Stonehenge," can hardly fail to be impressed with the fact that the Ancient Britons then were intelligent men, systematically governed at their Universities then held at Stonehenge and other Druidical Centres, where justice was administered, and such useful knowledge inculcated, as the finding of the Seasons by studying the Sun's motions for the great Almanac purposes necessary for Agricultural operations, good Government, etc.

We certainly know far more of the wonders of the Universe disclosed through the Telescope and the Minutiæ seen through the Microscope. But have we not to confess that our personal knowledge of the great Creator has not advanced in proportion beyond the early ideas of pre-historic men who lived more natural lives than we, and communed more freely with Nature?

Foremost amongst natural forces were the Sun and Moon, in connection with which the phallic force of generation was sometimes blended.

The Festival worship of the Seasons naturally became part of the National life as communities developed—special prominence being given to that of the Goddess Flora, now named "Spring" (still perpetuated by our May-day Festivals), and the Summer and Winter Solstices then located by sighting the extreme Sun-rise and Sun-set points across vertical stones, as shown in Sir Norman Lockyer's graphic illustration of Stonehenge, and evidenced by similar erections amongst nearly all early Peoples.

Stonehenge appears to be about the latest Druidical Circle erected, as it seems to have

been the most perfect, differing from the earlier Circles at Avebury, etc., in that the blocks were carefully hewn and morticed together by horizontal continuous imposts forming the elevated "Outer Circle" to thereby gauge observations.

That constitutes the characteristic feature of Stonehenge, which, I think, indicates that it was designed as the most perfect Observatory development of the Druids, who were thereby enabled to study the apparent motions of the Stars to complete their means of recording Almanac times for sowing, etc., to ensure food.

At the dawn of authentic History we find the clearest records that circles of Stones were set up for sacred and governmental purposes when the learned priests ruled the people.

The first Altar recorded is that erected by Noah (Genesis VIII., v. 20). Altars, etc., were built in special spots hallowed by religious associations, *e.g.*, Abraham erected his 1st Altar in the plain of Moreh, near "the place of Sechem" (Genesis XII., v. 7), and per verse 8 a 2nd one at Bethel. His 3rd Altar was built at Hebron (Genesis XIII., v. 18).

Similarly Isaac built his Altar at Beer-sheba (Genesis XXVI., v. 25), and Jacob built his Altar at Bethel (Genesis XXXV., v. 1).

At the close of that remarkable chapter XX. of Exodus, where the "Ten Commandments" were given which so powerfully influenced the world for good, we read—

"24. An *Altar of Earth* thou shalt make "unto me, and shalt sacrifice thereon thy burnt "offerings and thy peace offerings, thy sheep and "thine oxen: *in all the places where I record* "*my name*, I will come unto thee, and I will "bless thee.

"25. And if thou wilt make me an Altar of "Stone, *thou shalt not build it of hewn stone*: "*for if thou lift up thy tool upon it thou hast* "*polluted it.*

"26. Neither shalt thou go up by steps unto "mine Altar, that thy nakedness be not discovered "thereon."

The latter apparently accounts for the Sloping Mounds when kilt-like dresses were worn as in Roman illustrations, whilst Nature worship explains why unhewn stones were used, as per verse 25.

The following quotations are from page 6 of *Old England*, published in 1845 by Chas. Knight & Co., of London:—

"The stones which were taken by Joshua out "of the bed of the Jordan, and set up in Gilgal "supply the most remarkable example.—[The "name Gilgal itself signifies a circle.]—Gilgal "subsequently became a place not only of sacred "observances, but for the more solemn acts of "secular Government," as already explained.

I respectfully submit my opinion that those Altars were like those of the Druid circles, erections of natural stones, for the combined purpose of worship and use when observing the Amplitude of the Sun to locate the Seasons, upon observing which the food and comforts of life in primitive communities depended.

"Stonehenge as a Druidical Monument may "similarly be held to have been used for both "religious and civil purposes, for the Druids "were, at one and the same time, the ministers "of religion, the legislators, and the judges "amongst the people."

Dr. Smith believed that Stonehenge "was "the 'grand Orrery of the Druids,' representing "by combinations of its Stones the Solar Year, "the lunar Month, the 12 signs of the Zodiac, "and the then known 7 Planets."

On previous pages allusion has been made to the uses of Druidical Pointed Stone Circles, but as I do not know of any satisfactory printed description of their origin, it may be of interest to here record the impressions made upon my mind by personal inspections and observations at various Druidical Circles, etc.

I have been so much impressed with their almost world-wide use in Ancient Times, that it appears evident that they must have mainly originated from the common desire to find out precise Times and Seasons by naturally suggested means of universal application.

The most suggestive fact which early people could not fail to observe, was the Great Circle, which everywhere bounded their vision by what we call the Horizon.

At first they would have no idea of direction, and when hunting for game would ascend the hill-tops to look over the plains.

Looking around they would notice that the Sun rose in an Easterly direction and set towards the West.

One of the first important facts attracting their attention would be, that the Sun both rose and set far North of the mean East and West line in Summer, and gradually changed its Sunrise and Sunset points until a corresponding distance was reached South of that East and West line known as the Equinoxial Line.

Whilst watching those Sunrises and Sunsets, the distant hills and ridges naturally appeared to be ready marking points as the Sun gradually changed its rising and setting directions during successive days from one side of a peak or tree to the next. Hence it was inevitable that such Observations which we now designate by the "Amplitude method," should be first developed, and eventually settle across the East and West Equinoxial Line, as shown in Jacob's experiments.

That was the first diameter to all Druidical Circles, which, as already shown, were constructed with naturally pointed stones, to thereby locate the Sun's Seasonal "Amplitudes" from within such easily marked circles, across their respective pointed stones to the Sun-rise and Sun-set points on their prototype the Great Circle of the Horizon, where the distant hills and ridges suggestively marked the outer end of the daily line of Observations, as the Sun daily circled across the southern sky.

The Stone Circles thus early became centres from which the directions for travel, business intercourse, government, etc., emanated, as men ordered from Stonehenge to Wales or Scotland needed careful instructions, and the observance of directions by the Sun and Moon, to guard against straying eastwards, etc., in the then forest country.

Probably the next stage was that of fixing upon the necessary long-time-units of the Week and Month, so essential for the regulation of orderly communal life as population increased and village life began.

When they had neither clocks, watches nor sun-dials, their time was inevitably derived from the Sun for the Day, and the Moon for the Week and Month, because the regular varying phases of the Moon provided their only means by its independent universal signs, easily recognised by everybody.

From New Moon until the vertical **half-line** appeared was their 1st week ; thence to full Moon was the 2nd week ; the waning to the **half-line** registered their 3rd week ; after which the final wane to darkness completed their 4th week and the month simultaneously.

By that primitive system of "Time," public meetings, business and social appointments, etc., were made. Precise weeks of 7 days and months of fixed length came much later.

During the counting by crude Lunar Weeks and Months, the most easily marked **half-line,** which recurred with double frequency as marking the **fortnights,** would inevitably centre attention upon that conspicuous straight line which so auspiciously appeared to mark the diameter of the Moon **horizontally** at the rising horizon, and became **vertical** at the **highest point** in that cycle, after which its slope gradually turned down towards the **horizontal** position as it approached the setting horizon.

The **level** meaning of the word horizontal was apparently derived from that dual connection of the Moon's half-line, which thus appeared **level** at both "rising" and "setting" on the horizon, though with then different halves of the Moon upwards, at what is still interestingly termed the Moon's "1st Quarter."

Further, it must have been noticed that at the "3rd Quarter" that **half-line** again appeared truly levelled at "rising" and "setting," although the opposite half-discs of the Moon were again reversed at that uppermost "Southing" point where the **half-line diameter** became vertical in the heavens.

Thus it was inevitable that the only straight and vertical line thus appearing in the Sky as the pointer so distinctively indicated by Nature, should become the central point of Observation, and give birth to that great **MERIDIAN LINE,** which still universally marks the centre-line of Astronomical Observations all over the world.

That **half-line diameter** of the Equinoxial Moon was also naturally taken as the unit of celestial measure and further gave birth at a later stage to the "degree system" of measuring angles of Elevation, etc., when it was found that 360 of those Moon diameters measured the celestial meridian of the Sky from North to South, as well as the two semi-circles between the same points along the horizon via both East and West.

As the Sun appeared to have the same length of diameter as the Moon, and their combined diameter measured 360 times round the full belt of the horizon, whilst the great Sun-God was later found to move its comparative midnight place amongst the Fixed Stars, a 360th

part of the celestial circle each 24 hours' day, the Meridian diameters of the Sun and Moon were combined to form the Sacred **Degree** Unit of celestial measure, and that eventually suggested the 360 days' geometrical year which some nations long maintained.

They were then obliged to nationally record Time for Public convenience, and seeing that the "Indicators of Time," whether Sun, Moon, Stars or Shadows, all worked in circles, early Observers could only register and demonstrate their ideas of "Time" by erecting those lasting Stone Circles which denote their Observatory Sites still preserved to us through having been deemed "Sacred" owing to the ministrations of the Druids and Priests thereat.

The Celestial Meridian Line translated to the Druidical Stone Circle, consequently lay from North to South, crossing the Equinoxial East and West Line exactly at the centre of the Circle. Those crossed diameters thus divided the Circle precisely into 4 quadrants, and also provided the very-much-needed fixed North, South, East and West directions which are now so easily found by our compasses and maps.

That method was universally true throughout the World, and therefore, as though decreed by God for all races and creeds, became the general basis of instruction when the Priests imparted the then very necessary teaching respecting the directions towards various parts of their countries, the circular motions of the Moon and Stars, and more especially those of the Sun during the respective Seasons of the Year, as Time had to be recorded by regular Observations made at recognised centres in each district, to mark their Almanac Times for Agricultural Operations, Government Arrangements, Assizes, Assemblies, Festivals, etc.

Meridian Observations of the Sun were, however, far too difficult for early races, who through very long Ages had to depend for their knowledge of the Seasons upon the "Amplitude Method" of observing the Sun-rise and Sun-set points, which approximately vary according to the Latitude of the place of Observation.

Within the Tropics the variations of the Amplitudes being less were not so noticeable.

At London, in Lat. 51°, the extreme Amplitude at the Solstices is 40°, whilst North of Yorkshire, as demonstrated, it is 45°, so that at the Summer Solstice the Sun "rises" due North-East and "sets" due North-West, likewise at the Winter Solstice the Sun "rises" due South-East and "sets" true to South-West, thus forming those precise "Intermediate points" shown by the Sun-loops upon the Druidical Astronomical Instruments found in Ireland and at Zimbabwe, Mexico, etc.

In Latitudes above 60° the Amplitudes would be wider, but the great point to note is that the 45° radiator lines between N.E. and S.W. also cross the S.E. and N.W. lines at any Observatory Circle centred about Latitude 55°, therefore it is most probable that as peace and security were early advanced in Britain by its insular location from Europe, the headquarters of Druidical Observations would be located about Lat. 55°, because that marked the central 45° range of Amplitudes over the earth from 0° at the Equator to the 90° at the Poles.

SUMMATION.

That 55° most probably marks the Latitude in which Avebury and Stonehenge were when their renowned Stone Circles were erected, as Julius Cæsar records that "The System of "Druidism is thought to have been formed in "Britain, and from thence carried over into "Gaul; and now those who wish to be more "accurately versed in it for the most part go "thither" (Britain).—*Ex "Old England."*

Thus both astronomical reasoning and history definitely indicate that probability which shows a change of 55° — 51 = 4° in Latitude, as Stonehenge has drifted Southwards through the same agency which I have proved to have deflected the Great Pyramid 7° in about 5,000 years, hence this not only confirms the "Change in Latitude," but by proportion confirms Sir Norman Lockyer's estimate of the Age of Stonehenge as about 3,000 years.

When readers realise how the Solstice Amplitudes widen beyond 55° and narrow below that Latitude, they will become more convinced of the likelihood of the great Stonehenge and Avebury Centres of Druidical Culture having been founded about Latitude 55°, as the Druid system of instruction by Stone Circles naturally radiated from there, and was thence easily adapted and made applicable all over the world.

[Still it is quite possible that the germ of that system originated in the Ancient Civilizations of Asia thousands of years before it was matured in the more invigorating Climate of Britain.]

That basis of "Time," so readily recorded by the Druidical Circle System, was absolutely essential to foster the welfare and prosperity of all early communities and nations. It was capable of universal application through indisputable and unalterable natural phenomena in all Latitudes, because the only variation was in the widening register of the Amplitudes as Latitudes increased with the distance from the Earth's Equator. Therefore the **full lines** shown upon the following diagram were universally true for Druidical Circles in every part of the World, and though the **broken lines** bounding the changeable shaded parts between the Solstice Points registering the Amplitudes, widen as Latitudes increase towards the Poles, the pointed stones admirably served to locate those Seasonal Amplitudes in every direction and climate.

Further, the Seasonal Lines always crossed at the central point for Observation in every Circle, as I have shown by the dotted line at the ⅜rds angle for Beltane (May 1st), which when extended from its Sun-rise point across the Circle's centre to the opposite stone, marked the "Halloween" Festival's (November 1st) Sun-set point, whilst at a corresponding angle the line from Sun-rise at "Halloween" extended across the Circle's centre located the "May-day Festival of Flora at Beltane's Sun-set point."

The 8 numbered points of direction upon the Horizon are indicated by Sun-knobs upon the Astronomical Instrument of the Druids, shown on page 329.

Only the shaded sectors between N.E. and S.E., also between N.W. and S.W. would be reduced in width as the Latitude decreased to 0° at the Equator, but however the Amplitude width was reduced, "Beltane" and "Halloween" would be located at ⅜rds of the full Amplitude range from the Equinoxial Line.

EXPLANATION of DRUIDICAL CIRCLES.

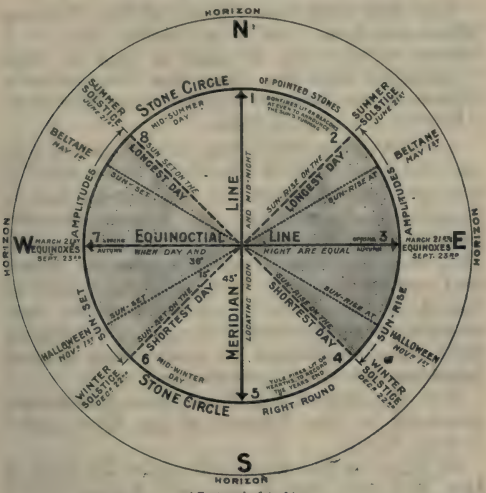


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DIAGRAM EXPLAINING the use of DRUIDICAL STONE CIRCLES, SHOWING how the LENGTH of the YEAR was FOUND and MEASURED each YEAR'S-END across the POINTED STONES, which were of WORLD-WIDE use. Everywhere that SIMPLE PLAN was true in all its details, subject only to the width of the SHADED FANS being varied proportionately as the Amplitudes increased with the Latitudes towards the Poles or decreased in ratio towards the Equator.

Thus was developed that simple and almost ideal Druidical system of erecting vertical stones in circles for Universal Observations.

The foregoing explanation of Druidical Circles, together with the 60 pages (from 289 to 349) describing the other more telling features of the chief Druidical Observatories, must suffice for this Edition.

Some circles appear to have been designed with groups of tumuli and plate-like vallums adjoining. Their elucidation would be too lengthy to explain herein. Anent such Tumuli the late Sir Richard C. Hoare rightly stated that "we must not consider every barrow as a "mere tumulus, or mound, loosely or fortuitously "thrown up; but must rather view them as "works of evident design, and executed with the "greatest symmetry and precision," as will be apparent from the illustrations shown on page 311. Moreover they frequently had definite alignment relations towards each other and the adjacent central Observatories.

The fact that similar circles and Mounds have also been found in America, etc., indicates to my mind that they, like the Pyramids there, and probably elsewhere, had an independent origin, as men were naturally led by the Circular motions of the Shadows of the Sun and Moon to erect pointed "*sighting* stones" in circles.

Some Antiquarians believe with fair reason that the British Circles at Stonehenge, etc., evidence the continuation of the Philosophic Worship which appears to have spread Westward from its original source in Central Asia or India, as Stone Circles are found dispersed through Persia, Asia Minor, Central, Northern and Western Europe.

The first authentic record of the Western Movement from Asia is in Genesis XI., v. 2, which reads, "and it came to pass as they "journeyed from the East, that they found a "plain in the Land of Shinar; and they dwelt "there," *i.e.*, in Babylonia.

As that agrees with Scientific evidence, and the historical facts of the Bible have been so strongly corroborated by the researches in Babylonia, Egypt, etc., we may reasonably believe that Moses when writing the early chapters of Genesis, as an Egyptian prince had access to the wonderful Libraries of Egypt, from which he epitomised the best thoughts towards truth in his graphic masterly style—then sufficient to satisfy the mental development of his generation.

The worship of the Moon was extensively practised by the Nations of the East under various forms.

In Egypt it was honoured under the form of Isis, and was one of the two deities which commanded the reverence of all Egyptians.

In Syria it was represented by that one of the Ashtaroth, surnamed "Karnaim" from the horns of the crescent moon by which she was distinguished.

In countries adjacent to Palestine Sabianism prevailed, of which the direct homage of the Sun, Moon and Stars was characteristic, as per Job XXXI., v. 26 and 27.

The warning of Moses (Deut. IV., v. 19) seems directed against that Nature worship.

His reference to the Sun and Moon in Genesis I., v. 14, which reads, "let them be for "signs, and for seasons, and for days, and years," does not necessarily imply that the earliest people knew the length of the Year, as that was far too lengthy a period for primitive men to grasp, and no doubt took thousands of years to correctly ascertain as Moses knew.

The Hebrew word there used for "Year" simply means "a period which repeats," and was therefore equally applicable to the Lunar Month to which it almost certainly referred, as the Ages recorded for the early patriarchs, etc., prove.

Investigations amongst primitive men display the crudest ideas of long-time units. The Australian Aborigines knew little beyond yesterday, to-day and to-morrow. The wild Arabs and natives of Central Africa, etc., count by the Moon, as we may rest assured the early people mentioned in the Bible and pre-historic ages had to do, when they did not know the length of our year, which was too long for their mental grasp.—Indeed we are only able to realize it by our printed Almanacs.

The inevitable gradual extension of their so-called "year" as the first long-unit for counting Ages, is explained from pages 150 onwards, and in the pink "Bible Ages Section," which crudely traces the evolution of the term "year" from its original application as the Lunar Month thus used until the time of Noah.

Noah appears to have instituted the 5 months period, so easily counted on the hand; whilst later, Jacob through his patient observations found the "six months year" by his rational efforts to increase the breeding powers of his flocks and herds, whereby the wealth and truest prosperity of himself and his descendants was assured.

As there described, Jacob (by means of the "Amplitude" Stakes he so usefully applied when serving with Laban) discovered the "two six-monthly seasons" by which he could gain *two crops of Sheep and Goats per year*, whilst Laban and anyone else not knowing the secret could only gain one, so long as Jacob kept his secret and mated his flocks at those precise times and provided suitable pasture, etc., as he evidently did.

The immense advantage thus secured to himself and his family, so long as it could be kept secret, was naturally seized upon by Jacob, who fully realized its importance, and so impressed secrecy upon his children, who so long continued that most simple means of recording their own ages and the breeding times for their flock, by simply "sighting" their so-called "years" each time the Sun rose over their two stakes (then fixedly pointed due East) at the Equinoxes in March and September, which we know would only count six months to such mis-named "years."

The wealth of their Race was then counted in Flocks and Herds, which were of the utmost importance to the people in that Nomadic State, as the best sustenance was thus secured to their families, who could then hire servants for attendance and protection whilst their families grew numerous, vigorous and strong.

That, together with the true observance of Seasons secured by Jacob's discovery of the 6-months year, to my mind satisfactorily accounts for the wonderful prosperity of the Israelites from that time, as they led an industrious simple life, in accordance with the Seasons and those Natural Laws upon which true happiness and prosperity depend.

Consequently that "6 months year" was traditionally kept by the Israelites until the Exodus, when Moses instituted for them the far more advantageous 12 months year, which he had learned from the Egyptians.

Thus it came to be that the Exodus began a "New Era" for the Israelites, who were so significantly brought out of Egypt at the Equinox.

Hence we find that the Bible Ages of men born after the Exodus, being counted by the 12 months year, agree with the present known length of life.

The unbelievable ages of early men recorded in the earlier chapters of Genesis thus appear to be rationally solved and brought down to the normal length of life, which prior to and during David's time was "three score years and ten" as now.

We may thus accept that rational explanation of the gradual Evolution of Bible Men's Ideas of the length of the "year," which was lengthened through its 1, 5, 6 and 12 month stages as men's mental grasp of long-time units expanded.

The painful records of Famines in the early chapters of the Bible and the most ancient writings, indicate the lack of true Almanac knowledge amongst early peoples.

We know with certainty from historic facts that the early Roman Race by the time of Romulus had only attained to a "10 months year," counted on the hands, and also that the Arabs used the 10 months year during a long period.

It is most significant to find that so long as the "10 months year" was used neither Race became prosperous, because their Agricultural development, upon which so much depended, was retarded through failure of crops for food, which could only be adequately raised by securing right Sowing, etc., in due Seasons.

There were three very natural reasons why early races were led to count 10 Lunar Months as their year by which ages, etc., were reckoned and long periods recorded.

1st.—The Lunar Month practically accords with the vitalizing periods of womanhood—essential to child-bearing and of prime necessity to human existence.

2nd.—Ten Lunar Months provided the readiest means of counting, being most easily counted and shown by the 10 units on the hands.

3rd.—Ten of such months complete the first period of child-development to its birth, and, as such, eventually suggested that period as the long-unit for counting lives, especially when it was found to be by far the most readily recorded from recurring moons.

That such Lunar Months were used in early Bible records, seems proved beyond the possibility of doubt by the following quotation, to which my esteemed friend, Mr. W. J. Boddy the well-known York artist, kindly drew my attention after reading some of my "Bible Ages" proofs :—

In that ancient apocryphal book "The "Wisdom of Solomon," Chap. VII., v. 2, we read "And in the womb of a mother was I moulded "into flesh in the time of TEN MONTHS."

Nothing could be more conclusive than that, as the nine Calendar Months now spoken of by mothers, was in ancient times most easily approximated by mothers who counted 10 Lunar Months of 29½ days each, to indicate the pro-creative period ending with child-birth.

When primitive peoples could only count by the moon, and had so far advanced as to have developed the finger system of counting by tens, they naturally adopted that 10 Lunar Months' period as the unit for counting lives, etc., until the true Year's length become commonly known very many centuries later.—(See Almanac page 32, and Bible Ages page 4, etc.)

We can thus understand how the 10 Months Year of the Arabs, Early Romans and others came into use.

During later Centuries, as agricultural knowledge and application advanced, farmers and others gradually began to use the 12 lunar months, which roughly served to keep them in touch with the Seasons, until eventually the true Year's length gradually permeated the West from Eastern Nations, whose earlier need and deeper shadows enabled them first to more precisely find the length of the Year.

We have seen (per page 324) that at Stonehenge special attention was directed by the "Friar's Heel" pointed Stone to the Sun-rise Amplitude at the Summer Solstice, whilst at Maes-howe the Observatory passage was pointed to "Barnhouse" monolith, marking the Amplitude at the other extreme of Sun-set during the Winter Solstice, but that ultimately they developed particular study of the Equinoxial Sun-set Amplitude there focussed by the celebrated "Watch-stone" monolith which marked the Equinoxial Line.

As the Amplitudes increase with the Latitude, the Solstice angular width observable in Maes-howe's Latitude of 59° was far more noticeable than that at the Sphinx in Egypt, where the Latitude of 30° only registers about half that width, therefore the Solstice Amplitudes became more prominent in Britain, whilst in Egypt they were too small to be precisely registered; consequently the earlier Astronomers who designed the Sphinx would be compelled by necessity to focus it due East to trace Sun-rise at the Equinoxes, when the inter-day change of the Sun's Amplitude register between two successive Sun-rises being some hundreds of times greater than the imperceptible ones at the Solstices, almost inevitably led to their observations being directed to the much simpler location of the Equinoxes as furnishing the long-desired key to their solution of the Year's length.

The present 20° deflection of the Sphinx presents a difficulty, which those who grasp the full import of the evidences of "Changing Latitude," proved by the Great Pyramid's Slope, etc., as well as the geological facts recorded may be able to overcome when they recognise the extreme antiquity of the Sphinx and of civilization in Egypt.

The Sphinx observers were still baffled by the fierce glare of the Sun-rise, and that increased width, etc., of the Sun's disc upon the horizon, resulting from aberration, refraction and atmospheric changes; therefore, as the successive morning discs over-lapped each other at the critical observing point, which was further complicated by the varied appearance of the Sun, there inevitably observed upon the serrated peaks of the Mokattam Hills above the horizon, they could not define such comparative discs as we find upon the level sea horizon, as when the Sun successively rose on one side of a peak, later behind, and then reappeared on the other side at a slightly different level, they could not get sufficiently accurate results.

Therefore as interest and need grew with the increasing population, they had to resort to the more perfect method of Meridian Observations indicated by the shadows of the Sphinx, which possibly suggested Pyramid Building.

The whole population worshipped the Sun as the author of life and beneficent ruler of

providence whom all glorified as "the living disc of the Sun rising to make perfect the life of man and bird and beast."

As the seasonal position of the Sun indicated the Seasons, the Egyptians naturally concluded that he caused them to return and replenish the Earth, hence they felt so dependent upon him for food that when Famines occurred they were readily led to believe that the scarcity resulted from his displeasure at their sin.

The observant Priests and Rulers, who realised that Famines were then largely caused by ignorant people sowing in wrong seasons, had a most difficult problem to solve, because their numerous people lived on narrow strips of cultivated land, extending over 1,000 miles southwards, which could not be widened beyond the Desert Hills bounding the Valley of the Nile.

Those long 1,000 mile strips involved ranges of climate about equal to those between the North Sea and Mediterranean, England and Italy, or Canada and Mexico, therefore not only did the kinds of crops vary, but also the times of the year at which the soils must be prepared, crops sown, etc., as clearly evidenced by the "Seasonal Notes from the Egyptian Calendar," reprinted on the end page, where we note that the chief corn food called Dureh was sown part between March 13th and April 13th, and in another district Dureh was sown about July 12th, whilst in yet another case the sowing was between August 4th and 30th, although the harvest for the first kind had been passed about July 20th.

Therefore it was an imperative necessity that they should have Almanacs throughout Egypt to know exactly what Agricultural, etc., work required doing at precise times as we do now.

Some tried years of 12 moons (354 days), which in three years removed their Almanac Times over a month, causing wrong Sowing Times.

Then the geometric year of 360 Days to the Yearly Cycle was used by some, who consequently within six years drifted their time more than a month out of gear with seasons, and got worse as time went on.

Further refinements resulted as truer observations were made, and amended years could be impressed upon the extremely reluctant and conservative people, as Egyptian history so emphatically shows.

Yet as population increased in that easy living country, the growing need for food called forth intenser necessity for increasing the yearly food crops by repeated sowings and greater varieties, which the Priests and Rulers knew could only be maintained by truer Almanac records, and as all the people worshipped the Sun, the Priestly Observers were able to induce the people to co-operate with them in raising that wonderful series of Pyramids, which my long series of experiments has convinced me were successively built for the great purpose of finding out the length of the year, after the Priests had by experience realised that their mighty object could best be attained by studying the Sun's Meridian Shadows cast from the highest pointed erections they could best build as Pyramids.

Of course they did not begin with the idea of building the whole series of Pyramids, or no generation would have had the superabundant courage and determination to commence. They simply set about building their first one, in the expectation that it would serve their purpose. Then, as zealous Astronomical High Priests and Rulers during later generations aspired to attain truer results, they respectively erected new Pyramids or amended the slopes of previous ones, to better locate the Equinoxial Slope which formed the vital basis of Pyramid research.

The attainment of that essential Slope was by far the most difficult and useful work which the combined wisdom of men has ever accomplished. It, apparently, took many centuries to perfect, as they not only had to find that exact angle which the Sun only indicated precisely at noon once in about 128 years, but they were unknowingly being baffled by the two then inexplicable and therefore incalculable factors of the "Precession of the Equinoxes" and "Changing Latitude" constantly deflecting their slopes by minute degrees beyond the present speed of Change.

The original Pyramid builders would thus have far less idea of the magnitude of their task than I had some years ago when starting to write a short paragraph suggesting the simple Almanac Reform herein outlined for the benefit of humanity. That led me to realise the fact that with our complex civilization, such Reforms are more difficult to accomplish than when Julius Cæsar, almost individually, ruled over the then known Civilized World.

His will carried, whereas now the growing selfishness, multiplicity of interests, and ever-increasing rush of business, together with vast out-put of light literature and newspaper paragraphs, necessitated extraordinary labours and interesting results to engage attention.

The lethargy of the masses of over-wrought people required such strong interest to arouse them to effective activities beyond their momentary needs, that I was compelled to undertake vast labours and investigations, which I should otherwise never have dared to begin if the magnitude of the work could have been foreseen.

But as interest grew, and the sense of that duty to humanity increased, the work ceased to be burdensome, and so far developed into a labour of love that I felt encouraged and strengthened to go forward.

Zest was given to the work as I became impressed with the noble self-denial of the Ancient races of Pyramid Builders, Mound and Druidical Circle Erectors, who industriously and systematically toiled through so many generations to confer upon mankind the immense benefits we now almost insensibly enjoy through Almanac knowledge handed down to us during past generations, even though it is still imperfect.

If we could realise the chaos and world-wide dangers of Famines, Pestilence, wars of extermination waged for food, fertile areas, etc., in Ages before the length of the year was known, there would be little difficulty in engrossing the attention of the populace upon the sterling advantages and conveniences which would result from the simple Almanac Reform proposed.

But, unfortunately, the masses, who rise like the sun to accomplish their daily round of duties, can hardly afford time to focus their attention upon the daily Meridian of the Almanac as they hurry through work, home and social duties, multiplied interests and recreations, over-strained by the unnatural artificial exigencies of city life.

They require something like an earthquake of stimulating zeal and a direct scent of the benefits they are going to receive before their dominant self-interest is aroused. They hardly give a thought to the Almanac, much less worship it, therefore they cannot so easily be brought to help forward its improvement as the natural Egyptian worshippers of the Sun were unitedly led by their Priests to build the Pyramids for most useful Almanac purposes.

The Ancient Egyptians knew far more painfully than we do the growing problem of over-population, which the most powerful incentives there prevailing rapidly increased. Slaves were regarded as wealth and used instead of animals in that wonderful Egypt, where even to-day the farmers prefer to keep and pay for five men rather than one horse, as they together eat exactly the same food, and can be sub-divided when the ploughing season is past.

Moreover, polygamy and the keeping of female slaves as concubines to increase slaves, prevailed from the earliest times, whilst the cost of living was the cheapest in the World, because no one was then allowed to make "corners" to raise the cost of food. Even now a child can there be reared for a total of 2½d., or five cents., from birth to a self-supporting age.

The increasing difficulties accruing through their narrow 1,000 mile strips of fertile land being bounded on the outside by barren deserts, and therefore incapable of expansion to feed the increasing populace, made intenser culture for increased crops imperative, as the people could not emigrate across the desert to Arabia, etc., as their neighbours there and elsewhere were in the same plight, and moreover were intently watching for a favourable opportunity to descend upon the coveted fertile Nile Valley.

The Egyptians were, therefore, compelled to maintain a large population to repel encroachments upon their limited strips, and were cooped up in that narrow valley where stern Nature compelled them to solve the food problem, by their only possible means of increased crops through closer acquired and applied Almanac knowledge, then best derivable through studying the Sun's movements by the easiest method of recording its seasonal shadows cast from high erections best built as pyramids.

We do not know whether the Egyptians conceived the Pyramid idea from the Sphinx's Shadow, as seems quite likely, or whether the Pyramid method was invented by earlier races in the Euphrates Valley, as the Bible record of the Tower of Babel indicates as probable.

The latter origin seems supported by the terraced structure of the earliest Egyptian Pyramids at Medum and Sakkarah. Those, as already shown, were so significantly built to locate the Summer Solstice, which, as we have seen, engrossed the attention of the Chaldeans, Babylonians, etc.

EVOLUTION OF THE PYRAMID SYSTEM.

The Medum Pyramid is specially interesting as evidencing the Evolution of the Pyramid by natural stages from the level platform or Mastaba form shown in the Pyramid Emblem drawn for me in Cairo, by Professor Maspero, on page 194.

They began like all Primitive Races, with the simple Pole, monolith or obelisk erected as high as possible ; then, finding its shadows too short to register the Summer Solstice, they raised it higher by building an elevated platform as shown by the "Original Mastaba," A.A., in Fig. 1 of Professor Petrie's section of the Pyramid of Medum on page 201.

The Obelisk mounted on that platform cast a proportionately longer shadow, better serving their longed-for purpose of more closely locating the year's length by annually registering the precise Season of the Sun's return.

Thus encouraged by knowing that they could get truer results from greater heights, they superposed another platform by a curiously interesting method then rendered necessary because scaffolding had not been invented.

They had to resort to sloped terracing, after the style shown by the Chaldean Temples, and build their gangway outside the original Mastaba along its side slopes from the ground level, to convey the material then built over the 1st platform to form the 2nd platform, above which the Obelisk would be elevated gradually as each of the courses were successively laid.

The slope from the 2nd platform appears to have been symmetrically finished upwards to the same angle as the 1st, and as the same Solstice angle of the Sun shining over the increased heights from the Obelisk's top would project the longer shadow tips further outwards, the builders had to finish off their building gangway with a complete outer coat or layer to the still essential Solstice Slope required to register the highest elevation of the Sun at Noon on Mid-Summer Day, whilst preserving the orientational and directional value of their Observatory.

In later years, being further encouraged by still better results, and a growing desire to excel (because the knowledge of the Year's length thus acquired had so materially helped their food supplies, and eased their national difficulties), they raised still higher platforms by similar stages—each of which necessitated a corresponding outer finished casing—until the top platform area became too small to admit of further elevation.

They thus reached their limit and had to improve their design, as experience had proved that the results were not increasing in proportion to their efforts. A 60 ft. Obelisk raised on the first 60 ft. Mastaba platform increased their lengths of Shadows and multiplied the daily differences by 100% and saved two-thirds of the labour which a solid Pyramid raised to that height would have involved, whereas the top platform addition of 40 ft. (which involved vastly more labour than the first 60 ft.) only increased their preceding shadow length by 19%.

They experienced a further difficulty because the Sun's ½° width above that 250 ft. height (including the Obelisk) allowed the Sun's side rays to encroach upon the Apex of the Obelisk's shadow before it descended to the Meridian

line where it had to be measured on the Shadow-floor. That tended to diffuse and spoil the required sharpness of the Shadow as the height increased.

To remedy that they took the obvious course of building a broad Apex to the Pyramid, as that proved more serviceable than the Obelisk, and according to Professor Petrie's diagram, they continued its slope down to the ground-level at about the Equinoxial Angle, which was ultimately found to show far more discernible daily differences of Shadow lengths, owing to the Sun's then seasonably increased rate of Elevation.

That great advantage gained, led to the improved style of Pyramid being adopted for the later series, until they culminated in the Great Pyramid's 484 ft. height, which gave more than 2·4 times the length of Medum's Shadow difference cast from its 200 ft. height.

I need not detail the meagre particulars of the intermediate Pyramids, but before leaving Medum's record, desire to impress my belief that the reputed building of Medum by Sneferu the 1st King of the IVth Dynasty, about 3998-3969 B.C., was merely the completion of the final Pyramid casing which began the new Era of Equinoxial Pyramid building, under that Dynasty then raised by the evident vigour and progressive development of Sneferu's time.

I cannot believe that the practical Egyptians would ever have been so foolish as to have wasted the vast labours expended upon polishing the successive interior casing layers, shown on Fig. 1, if they had originally designed to build outer layers over them. No! they had to naturally follow those slowly reasoned stages which appeared to Primitive Astronomers as most likely to quickly yield the results they desired.

They began as sensible members of the "least trouble society," by moderately elevated platforms upon which their Obelisks were reared to most easily gain the longest shadows, just as we may rest assured that the Druids at Silbury Hill began with lower mounds and "Sighting Staffs" which were enlarged as interest and necessity grew.

The Medum Pyramid's series of in-built polished casings indicate very definitely the protracted stages of development which were respectively built during the reigns of Kings before Sneferu, who probably built the outer casing.

It is most probable that many years elapsed between the various enlargements, because the Priestly Observers would strongly incline to uphold their observations and consequent theories, which were dependent upon such minute shadow variations beyond the records of their ancestors.

But when once they learnt the superior value of the Equinoxial Slope, which showed such widely-increased differences in the Meridian shadows of the then most rapidly varied yearly elevation of the Sun, their interest would be greatly intensified, because they would feel sure that they were on the right track for securing the very acme of human knowledge, furnishing the key to study of the Universe, and Almanac knowledge most valuable for National Life.

Doubtless they began the erection of the first Equinoxial Pyramid with redoubled zeal born of such an enthusiasm for their new ideal source of knowledge, as we need not expect to realise amidst the present vastly changed bustling conditions of life.

Theirs was more a life of contemplation, overawed by the never-failing daily presence of the Sun, then regarded as the living Creator who watched over and directed his people. By his regular presence they were encouraged to seek out his yearly course.

They felt themselves engaged upon the greatest problem which had ever engrossed their forefathers, who had struggled so earnestly to solve the year's length. Therefore, when they had made such a good attempt at the Equinoxial Sloped Pyramid which they thought could best solve their difficulty, their descendants by successive efforts built a truer series of Pyramids, as they gradually became convinced that they were within measurable distance of solving that most precious problem for their generations and humanity at large.

At the present time we have thousands of the greatest minds among all nations intently studying scientific phenomena, observing the Sun, Moon and Stars, glorying in the discoveries of minor planets, speculating enthusiastically about the possible inhabitants of Mars, etc., but their united enthusiasm and earnest labours can hardly be compared to those of the Ancient Egyptians, who believed themselves working under the direct eye of their living Lord, the Sun, to solve the problem of his yearly movements, then engaging the attention of all in those days of ample leisure for discussion and research by crude shadows from huge instruments.

That was **the absorbing problem of their lives,** all the more fascinating because the Sun-Lord appeared to coquet with them when culminating some years just below the Equinoxial Slope, and at others just above, yet never recurring to precisely the same Equinoxial noon Altitude within any observer's life-time.

They were thus led on to sustained efforts because the then unmeasured length of the Yearly fraction of a day beyond the 365 days year complicated their observations, which were most easily registered by the shortest Equinoxial length of the Pyramid Shadow's Apex from the Pyramid's base **at Meridian Noon,** as shown by photographs on page 78 a.

Unfortunately the Great Pyramid's Apex having been demolished, the Pyramid does not now cast that distinctly pointed Shadow which worked round Northwards like a clock pointer, registering that essential point of high Astronomy, precise noon on the Meridian Line.

Another extremely powerful incentive to their efforts was the prevailing idea that the Heavens formed the abode of the Souls of their ancestors, who were elevated to become stars of greater brilliancy and magnitude according to their zeal in good and useful works on earth.

That was a beautiful and sublime idea, which still dominates some African Races, as was so naturally expressed by some African Chiefs, who on hearing of our revered Queen Victoria's decease, reverently said : "There will be another bright star in the Heavens now."

SUMMATION.

Therefore we need not wonder that the Ancient Egyptians took such marvellous care of the bodies of their ancestors (and that the Celestial Worshipping Chinese still worship their ancestors) who, having gone to eternal life, were regarded as living and watching over their relatives on Earth, by shining above to guide them on their heavenly way.

That naturally suggested germ idea of Eternal Life became the mainspring of their existence, when they nightly observed that the stars circled across the sky apparently following their glorious life-giving God, the Sun, which seemed to go down each Sun-set behind the earth, whilst the brightest stars were seen to come from whence the ever-glorious Sun arose each morning, and follow along his path.

We should remember that though the number of Stars observable in England by the unaided eye is about 3,000, that number is vastly increased in the rarified climate of Egypt, where about 100,000 may be seen by means of that extra keenness of sight which we find in races near the Tropics. Therefore, as they could also realise from the glimmering shimmer appearing beyond the Stars there seen that myriads of lesser lights appeared to join in the wake of the Stars leading the nightly adoration, we may appreciate that there was far more reason and reality in the Ancient Egyptian Worship than warrants the scoff of immature minds glazed over with the veneer of training in some so-called Colleges, when we remember that the Study of Mankind should naturally be humanity, to further unselfish aspirations to higher ideals of useful life.

Yet our civilisation has not risen to that greatest educational need of life by studying Human Nature above all things, in view of the great fact that our whole life has to be spent in constant touch and daily work with our neighbours. Where can we find the needed Professors of Human Nature?—to guide the young into determination to work for nobler aims than selfish enjoyment and scheming to exact more from their less fortunate fellows—to stop the wholesale crimes of starving poor people in Winter by exorbitant prices for coal, or artificial scarcities and inflated prices, created by professional gambling and "corners" in Wheat, Sugar, Cotton, Land, etc.

Surely the Ancient Egyptian Ideal was nobler than much of that vaunted "smartness" which is now-a-days wrongfully awarded the public prizes of life, and leads to those huge blunders and crimes against human nature made by some Officers in the Army, and now spreading to our great railways, etc., through men of exclusive University training, who during the most perceptible years of life have failed to get into practical touch with the sterling worth and abilities of the men over whom they are placed.

Such men who now scout the idea of "Eternal Life" and future rewards or punishment, readily applaud the achievements of science (which has most benefited from the strenuous labours and keen perceptions of men like Galileo, Sir Humphrey Davy, Arkwright, Geo. Stephenson, etc., who have risen from the ranks

and provided the ever-requisite energy). They accept the wonders of Astronomy, even to the "indestructibility of matter within the whole Universe," and yet deny the indestructibility of that Soul of Life within them, which they cannot locate by any of the organs of sense, although they still know it to be constantly developing within them as their thoughts and ideas grow from whence they know not.

Though the invisible souls may not become Stars as the Pyramid Builders fervently thought, those of us who have lost dear relatives and friends by death, when old enough to realise the still living value of inspiration from such departed lives, can appreciate something of the ardour with which the Egyptians increasingly tended to watch the progress of the heavenly Stars, which thus followed the movements of those two gloriously beneficial Orbs they worshipped as the living Sun and Moon.

But because the Sun dominated their attention as the source of energy and life, whilst the stars appeared to pay homage to his light and leading by steadily following round each night to almost exactly the same point, they could never have dreamed of focussing their observations upon the then undiscerned daily differences in Star movements to find the year's length as we do now. That to them would have appeared like neglecting gold for copper when they were convinced that the Sun caused the Seasons and brought life to their crops and animated nature as well as mankind. Therefore we have good reason to believe that the Sun would remain their centre of Observation for many generations, as the numerous Egyptian monuments so conspicuously testify.

Still the great reverence paid to the dead, as shown by the wonderful Tombs and detailed in that mysterious "Book of the Dead" which formed the prodigious masterpiece of early Egyptian Literature during thousands of years, assures us that the Egyptians pathetically watched the Stars. They eventually noted that beyond the thousands of Stars "rising," passing overhead, and "setting," there were a few within about 30° from the Pole of the Celestial Sphere round which those circum-polar Stars finished a circulation about the same time each night.

That impression-making fact aroused their religious fervour and anxiety to discover what their believed starry Ancestors did during daylight as well as night, and as their only conceivable means of attaining that object was to burrow downwards, or build upwards, an Observatory Tube to keep out the diffused sunlight when looking Northwards, they cut those hitherto inexplicable descending passages into the base-rock, as shown for Medum in Fig. 1 under the core Mastaba A.A., and extended it at the same angle through each successive outer-casing when added.

The prime purpose of those square-cut Observatory Passages, so characteristic of the Pyramids, has been misunderstood, largely owing to the well-meant efforts of the late Professor Piazzi Smyth, who, when Astronomer Royal for Scotland, deduced the idea that the Great Pyramid's Passage pointed to the North Celestial Pole when it was supposed to have been located by the bright Star **A Draconis** about the year 2170 B.C.

SUMMATION.

I have a very sincere and respectful admiration for the late Professor Smyth's life-long work on the pyramids, but with all due respect for the ex-Astronomer Royal, I cannot accept his theory that the Great Pyramid was designed to enshrine Biblical knowledge for future generations; nor yet that it was the First Pyramid built.

Professor Smyth seems to have missed the solution of the problem by being led astray through accepting the idea (which fell in with his supernatural theory) that the Great Pyramid was the *first* built.—That thought seems to have been craftily put forward by the wily Egyptian priests to mislead foreign peoples in past ages, whereas subsequent antiquarian research proves conclusively that the Medum, Sakkarah, etc., Pyramids long preceded the Great Pyramid.

My consideration as based upon his remarkable investigations of the mathematical properties of the pyramids and the facts I have been able to gather from other works, together with my own experiments, lead to the opposite conclusions, *i.e.*, that the Biblical facts, measures, etc., were derived from the pyramids through the knowledge which Moses (the greatest early Bible writer) was privileged to acquire from the Egyptian Pyramid Priests.

The Great Pyramid was almost the last built, because it is the most perfect, and experience proves that all the great works of men originated in crude attempts which subsequent continuously improving efforts by later generations developed to greater perfection.

The various Measure Units (as the British Inch, etc.) were looked upon by Professor Smyth as prophetically foretold in the Great Pyramid, but I submit that they are far more likely to have been derived from the pyramid by the Alexandrians, and transmitted by the Greeks and Romans to later generations during the development of European Civilization.

The convincing proof of "Changing Latitude" displayed by the deflection of the Great Pyramid's Slope from the present Equinoxial Angle of the Sun, proves that the Star A Draconis was not in line with the Great Pyramid's North Observatory Tube in 2170 B.C., and as the "Change of Latitude" would bring other Stars opposite the passage entrance, I cannot believe Professor Smyth's version, particularly as it seems certain that a then circum-polar Star would so much better have served the purpose of the observers.

That the passages were used for Orientation as he and the late Astronomer, Mr. R. A. Procter indicated, is likely enough.

Probably those Observatory Passages were partly used in conjunction with the noon-day shadows to secure orientation, but the great purpose of their square design seems to have been to trace the motion of the circum-polar Stars by the most suggestive means of registering the passage time of the four Square Stars B, V, N and E of the Constellation Ursa Minor (Little Bear) when at its lower culmination, as then

the Star E would be registered by the mid-lintel over the Passage, V on the threshold, B on the right side and N on the left, to trace out the motions of those Stars, which are now found to complete their sidereal cycle in 23 hours 56 minutes 4 seconds, or about 4 minutes less than the 24 hours' day of the earth's daily rotation.

Therefore the four Stars of Ursa Minor would be registered in full view of the passage angle four minutes earlier each day, and complete the whole cycle like a huge cog-wheel turning each cog 4 minutes further daily throughout the year, during which it completed the annual rotation.

They would ultimately find that rather more than 366 of the Star cycles approximately brought those **four square Stars** of Ursa Minor to about the same central point along the "sighting-line" of their Observatory Tube during slightly more than 365 daily cycles of the Sun.

But as the Stars were most precisely registered at night, and the Sun's Shadow-records imperatively made daily at Noon, whilst they had neither clocks nor watches to time the intervals, and did not know the length of the Year as we do, they experienced very protracted difficulties.

The recorders of the Star-Motions would doubt the records made by the registrars of the Sun's Shadow, especially as every fourth year (Leap Year) the latter would record 366 days between the Pyramid's shortest Yearly Shadows.

The careful recorders of those Shadows would doubt the counting of the Star-Motions, and as both were right, but irreconcilable, there would naturally arise two determined schools of thoughtful men, determined to uphold their convictions and anxious to gain the cudos of finding the true year's length.

After protracted investigations, when both sections of observers were substantially proved to be right, they would find themselves in a worse quandary than ever, and embarrassed by all the perplexities and penalties of heresies then cumulating with religious fervour, for did not their glorious Sun-God renew the Seasons after 365 days, whilst their revered Ancestors (then regarded as enjoying the perfect knowledge and wisdom of Heaven) so persistently indicated 366 days. Which were they to believe?

They thought that their Ancestors having experienced those perplexities, and being well ministered unto by votive offerings, would not be likely to mislead them, but far more desirous of helping them; yet the acceptance of their 366 days' record might be a slight upon and call forth the terrible wrath of their all-powerful Sun-God, who might bring Famine, Pestilence and Death upon them as in Olden Times.

As both parties inflexibly held that the Sun, Moon and Stars revolved round the Earth, neither party had the slightest conception of the fact that the Earth rotated daily upon its axis through 365¼ days, during which it completed its Annual Revolution round the Sun, and thus made the 366th revolution recorded by the Observers of the four Ursa Minor Stars, thus designedly located by the Ascending Passage's four-sided Observatory Tube.

That furnished infinitely more useful and valuable information than the mere location of the North Pole, which could always be found about 30° above the Horizon, nearly at right-angles to the Pyramid's Equinoxial Slope, up the North Meridian line, indicated by the Noon Shadow.

The practical Egyptians knew perfectly well that they could far more easily locate both their Latitude and **the precise fixed position of the Polar Star** by erecting a pointed Pole or stone about the height of a man's eye, with another much taller Pole placed at a proportionate distance due North, so that the "Sighting-line" from the top of the lower crossed directly over the higher one to register the Pole Star's position by the higher tip. Indeed that seems most obviously to indicate the rational origin of the name Pole Star to denote the one thus primitively sighted across the Pole.

Therefore I cannot believe that the North Entrance Pyramid Passages were constructed to point to the Pole Star, but submit that they were designed to solve the far more interesting problem of Star-Motions, then requiring records of their revolutions, as a needed factor towards solving the greatest problem of the year's length.

Although those long series of Pyramid Meridian Shadow and Circum-polar Motions were carefully studied, the rotation of the Earth was not made clear until the discoveries of Copernicus about 5,000 years later.

That discloses a slight idea of the extremely slow evolution of early knowledge, from which we may consider that it is quite possible that the two Cults or schools of thought developed by the Meridian Shadow, and Circum-polar Observations up the Observatory Tube, may have co-existed and debated almost right through the building of the whole Pyramid Series, just as our Astronomical Observers still argue for one theory, whilst Mathematicians or Physicists demonstrate other conclusions as in the case of the "Rings of Saturn," "Sun Spots," etc., until positive proofs result.

The Star Observers, through the shining square limestone Passage Tube, might well believe that their system was the best, when the four Stars of Ursa Minor regularly appeared to touch the four sides of the entrance, as a rhomboid figure with shining angles thus precisely marking the transit. Yet as time went on deviations caused by the Precession of the Equinoxes and Changing Latitude would tend to make them more considerate for their opponents, who may have been considered at fault for not having attained to the perfect Slope of Pyramid necessary to give precise shadow observations.

It is quite likely (as suggested by the groove of the Dashoor Passage) that some of the later built Pyramid Observatory Tubes were fitted with crossing Strings to better register the transit of single Stars, as is now done by spiders' webs stretched across our large telescopes, and that then some bright Star's motion was traced at a different Altitude, but that must have been other than the Pole Star to thereby trace the circum-polar motion. Later the Greeks moved their observations lower to watch the two "Pointer Stars," in the Constellation of

the Great Bear, as in Greece they circle above the horizon, whereas in Egypt those Stars dip down below the North Horizon.

Still the 4° difference between the 30° angle of Medum's Observatory Passage and the later 26° of the Great Pyramid's like Observatory Tube, indicates that Change of Latitude which by its varying speed steadily added to their difficulty in detecting the true Equinoxial Slope, which they repeatedly attempted to secure by erecting higher and more perfect intermediate Pyramids.

We have not conclusive data to settle the progressive order in which the intermediate series of Pyramids were developed during the later persistent and protracted efforts made to build true to the Equinoxial Slope, which was most perfectly developed in the Great Pyramid raised to the height of 484 ft., thus magnifying the critical Equinoxial Shadow differences nearly 2½ times more than those cast from the heights of about 200 ft. gained at Medum and Sakkarah, and so enabling the Great Pyramid Observers to study their minutely measured shadow differentiations far more perfectly than had been possible from lesser heights.

Readers who followed my Sun-Shadow Diagrams A, B, and C, can readily see from the photo block of my Models on page 50 the proportionately increased shadows cast from the higher pyramids by the Sun **at precisely the same moment and angle of elevation.**

That fact, together with a glance at the bolder figures in the "Comparison of Equinoxial and Solstitial Data Table, page 72, and computations following on pages 74 and 77, will serve to show that the Pyramids had to be built so high to differentiate the crucial Shortest Equinoxial Shadow, which yearly so mysteriously fell upon different lengths of the Shadow-rod within the 4·45 feet gauge, there measuring the last day in each of 128 successive years.

When we realise that it is thus manifest that the true Equinoxial Slope only appeared to be shown by the constantly moving Sun once during 128 years, we may at one precise moment understand some little of the magnitude of the difficulty so determinedly overcome by the Ancient Egyptians, who accomplished that most mighty and valuable work which has been of incalculable benefit to humanity, who have since reaped the immense advantages still derived from true knowledge of the year and its ever-recurring Seasonal uses.

THAT GREAT FACTOR, SO ESSENTIAL TO HUMAN WELFARE, WAS INDEED WORTH ALL THE STRENUOUS EXERTIONS BY WHICH THE SELF-DENYING EGYPTIANS EVOLVED THEIR ALMANAC KNOWLEDGE BY PYRAMIDS FROM NATURAL PHENOMENA.

The exceedingly simple method by which the Pyramid Shadow Observers used their mighty instrument weighing 6,000,000 tons, is very remarkable when we see from the photographic proofs on page 78a and the two preceding diagrams, how obviously plain and suggestive was that easy, yet exact method, of measuring the Year's length, by cutting off the shortest receding shadow-lengths upon the Meridian Rod, to decide and keep record of the apparently varying fraction of a day required to complete the year, after counting the intervening days from each Spring or Vernal Equinox.

SUMMATION.

The last column of the Comparison of Equinoxial and Solstitial Data, on page 72, abundantly manifests the absolute necessity for the use of the Equinoxial Slope and vast height to spread the Sun's daily shadow variation sufficiently wide at the Equinoxes, to allow of precise registrations and comparisons from which alone true deductions could be made.

That ideal method of measuring the Sun's height by the length of the Shadow it cast from the Pyramid, furnished the easiest and clearest system imaginable after the perfect Pyramid Slope was completed, as the distance from the Pyramid's centre to the Meridian-point along the North base line was constantly known, therefore the Observers had merely to watch for the shortest receding Shadow on the Meridian Rod, as registered by the Pointed Shadow's tip, and then cut off that part of the Rod to file for permanent comparative reference as shown on page 78.

That, I submit, gave the most perfect graphic portrayal of the ordinary year's length beyond 365 days, which human ingenuity, patience and perseverance ever devised. It amply justified those stupendous efforts which later generations have never equalled, because when once that most precious knowledge of the Year's length was acquired for humanity, there was no need for further constructions of huge Pyramids.

Although it seems probable that the Great Pyramid was the last and most perfect, there is a bare possibility that the so-called 2nd or 3rd Pyramid was later built to a more accurate Slope, therefore I should like to see more perfect experiments conducted at the 2nd Pyramid, which only needs the shadow-floor clearing, as though the Apex is blunted and defective, it still surmounts that Pyramid.

Little heed need be taken to the names 2nd and 3rd, as the mere fact of later Monarchs being awarded those dis-used Observatories as Tombs, and having their names on them, does not prove that they built them.

The early impressions made upon my mind by Shadow experiments, led me to consider that the erection of Pyramids was the inevitable means to which early peoples must have been compelled to resort, in order to find the Length of the Year, by the then only possible method naturally indicated by Sun-Shadows. My researches, since made into Pyramid methods, amply justify the consolidation of those impressions into the now-established fact that the Pyramids were so used, particularly as I found that simple method still further evidenced by the Shadow Meridian-Line from the Obelisk in front of St. Peter's, at Rome, Ancient Eastern and Mexican records of Astronomical Time Methods using Obelisk Shadows, Sundials, etc., as epitomised on page 78 d, and more fully detailed after page 176. The later explanations and photographs of the Zimbabwe (South African) and Lhassa (Thibet) Obelisks, on a later page, further confirm that prime use of the Pyramids.

Other great uses naturally followed as the study of Pyramid Shadows, etc., gave great impetus to geometric studies, as references to pages 74, 77, 100, etc., testify. That led to the Pyramid District becoming the centre of University, Government, and Social life. The

Pyramid Orientation was used to give direction whilst weights, measures, etc., were taken from the impartial imperishable proportions of the Pyramid's Meridian register, just as the present day Metric System was taken from the best measures obtainable from impartially observed meridian records.

Naturally such greatly valued standards of weights, measures, capacities, etc., were carefully preserved in the Pyramid's Inner Chambers, as similarly our Standard Yard is built into the wall of the House of Parliament, and every civilized nation finds it necessary to safeguard its standard units of Time, Weights, Measures, etc., in special buildings.

The fact of the inter-noon variations of the Sun's Altitude and Shadow-lengths at the Equinoxes averaging about 200 times wider than at the Solstices, rendered the Equinoxial Slope imperative, indeed the main evidence of Pyramid investigations tends to emphasise the fact that **the Equinoxial Slope was the very quintessence of Astronomical research by the Pyramid method.**

That Slope decided the whole shape of the Pyramid, and in proportion to the base, controlled its size.

The chief use of the North slope was to register the year by yearly cutting off the Shadow at the Spring Equinox. Its varying length could only be precisely registered at noon, when the Sun crossed the celestial Equator over the Pyramid's meridian.

Therefore the Pyramid's Slope cut the **plane of the Ecliptic** and then marked the complete course of the Celestial Equator as the Earth turned round upon its axis during the Equinoxial Day. That would later enable the Pyramid Priests to locate the exact positions of those bright **fixed Stars,** which were later located to establish the **Signs of the Zodiac,** then so readily traced out by the observers looking up the Pyramid's Northern Slope to the Apex that pointed so ideally to each Tropical Star passing that admirably directed Astronomic line of sight.

That seems borne out by the very characteristic Egyptian Hieroglyphics water sign ^^^^ ^^^^ which is so significantly still used to denote the Zodiacal Sign of Aquarius in January the first month of our Year.

By more constantly recording the stars which passed the Apex of the Pyramid at precise times, when sighted from the North Entrance to the Observatory Passage, the whole course of the path of the Ecliptic amongst the Stars could be, and probably was, there first traced and mapped out.

Therefore it is extremely probable that the basis of that wonderful study of the Stars was laid by Pyramid Observations, for although we do not find public hieroglyphic records of that use till much later (as in the case of Egyptian Zodiacs at Denderah, Karnak, Tombs of the Kings, etc.) we should remember that the great value attached to the exclusive secrecy of that knowledge by the rulers of Ancient Nations would prevent any public records of early Zodiacs being displayed.

But as already shown, the immensely superior power and light of the Sun, then worshipped as God, would preclude the possibility of closely studying the Stars until the Sun's yearly course was mapped out, and that furnished the golden key to solve the motions of the Stars, which later became the easier and universal way of tracing the year.

As the courses of the Stars in their respective Zones of the Celestial Sphere were elucidated, further impetus would be given to geometric reasoning known as Euclid which attained the zenith of its development in Egypt by Euclid, who lived in Alexandria and probably derived his principles of Euclid from studying Pyramid and Obelisk Shadows.

But Time in all its phases of sub-divisions of the Days, Months, Seasons, Years, and Astronomical Periods constituted the purpose of the Pyramids, as prior to the establishment of a reliable and mutually convenient basis of Time, it was essential that its principles should be worked out by thoughtful Rulers as a necessary requirement of civilised life.

That was about as needful for them as for us now, when Time is regarded as so extremely important in our every-day life, that we buy expensive watches and constantly carry them about with us in our pockets, whilst in our houses we are not content to have simply one clock and one Almanac, but use several.

Just think what chaos, blasphemy, ill-temper, trouble, worry, etc., would result if we had not a system of Time to thereby regulate our daily life, with meal-times dependent upon when we were hungry, that varied by the state of our digestive organs, and still more aggravated by the Mid-Summer Days being twice as long as those of Mid-Winter, with 183 graduations between. Masters and servants each stretching Time their way to suit their widely different ideas as to when work should begin and end or meals be served.

Similar variant ideas as to when crops should be sown, taxes levied, rents collected, courts of justice held, schools, colleges, business houses, shops, etc., opened and closed, would prove lively. Whilst railways, shipping, tramways, omnibuses, carriers, parcels, post offices, etc., would be impracticable or extremely wasteful without precise Time, *e.g.*, If the driver of a train thought it was time to go, and the stoker said not, whilst the guard thought it was and the stationmaster was sure it was not, even if we say nothing about the traffic manager wanting to wait for a larger load, whilst the locomotive superintendent thought it was too heavy, we may be sure there would be very lively doings amongst them when they got their partisans together, if we had no reliable system of Time to settle those thus avoidable difficulties, and facilitate orderly arrangements.

By mentally applying the almost infinite needs for time in our domestic, business, social and public every-day life, we may readily realise that the welfare and prosperity of the Egyptian people depended upon the establishment of a complete Time System, of which the inevitable Day and length of the Year formed the great fundamental bases,

EGYPTIANS COMPELLED TO SEEK ALMANAC KNOWLEDGE.

How very real and pressing were the early Egyptian needs for true knowledge of the exact Times and Seasons for Sowing, etc., may in some measure be judged by the extracts shown on the next page from the Koptic Almanac. These indicate that the necessities of their rapidly increasing population compelled the Ancient Egyptians to erect the Pyramids to find the true length of the Year as the first great step towards ensuring the fullest crops to feed their people.

Readers of the list of sowing, etc., times thus tabulated in datal order, will be thereby reminded that to raise crops men need to know when NOT to sow as well as when to sow; otherwise not only would seed and labour be wasted, but the ground would be occupied by partly grown crops and sowing times drifted to the great risk of Famine—particularly as narrow Egypt stretches nearly 1,000 miles directly South—hence the different times required for sowing similar crops in Upper and Lower Egypt constituted a problem of vital national importance not so pressingly raised in countries like Assyria and China, extending more East to West.

But the most remarkable fact disclosed by this list is the unequalled variety and quantity of Crops which can be grown in Egypt when exact Almanac knowledge is applied.

We may specially note the 3 different kinds of "Dureh"—a small Indian Corn used as the main food of the people—requiring special attention as calendared on March 13th, April 13th, July 12th, July 20th, August 4th and August 30th.—These and others I have connected by indicator letters for handier reference, thus:—D 1, D 2, D 3, D 4, D 5, D 6, D 7.

Nowhere else in the World can such abundantly varied Crops be grown with 2nd and even 3rd Crops raised within the year on the same land.

Bearing this important fact in mind, together with the vital fact (ever present to the minds of the great Rulers of Ancient Egypt) that the area within which food could be grown was generally restricted within the narrow limits of the Nile Valley—as shown on page 22, because the fertilizing waters of the Nile overflow were confined within the two ridges of Hills which extend almost continuously near both banks of the Nile—therefore, beyond the Delta, only those narrow strips of land were available for Crops.

The more Ancient Egypt grew in population and greatness, requiring armies to protect its coveted, yet limited, easy growing lands on which they were forced to grow more food by intenser culture, the more pressing and valuable became true Almanac knowledge applied to Agriculture, until the Rulers realised that the very existence of the Nation depended upon exact application of Seasonal data which they could best derive by Pyramid observations. Therefore, being thus early pressed by growing necessity, they undertook the building and perfection of huge Pyramids to promote and permanently establish the welfare of their race. By doing that they conferred the highest practical benefit upon humanity, whose best minds had until then (as in later Centuries) applied their highest efforts to Almanac research and its economic application to meet growing human wants most pressing for food supplies.

SOME SEASONAL NOTES FROM THE MODERN "EGYPTIAN (KOPTIC) CALENDAR." *

* By R. L. N. Michell, B.A. (Oxon.) Published by Luzac & Co., London.

As POPULATION INCREASED the VERY EXISTENCE of the EGYPTIAN NATION was found to DEPEND upon applying EXACT ALMANAC KNOWLEDGE to increase CROPS.

1st Koptic Month, TUT.

1900.
1 Sep. 11 Koptic (New Year), 1617
,, 13 Sow clover
,, 17 Jasmine planted
,, 18 Cotton gathered
,, 21 Olives gathered
2 ,, 22 The day and night equal
,, 23 Autumn begins. Limes abundant
,, 26 Highest rising of the Nile
,, 27 Opening of water channels
,, 29 Make syrups of lemons & other fruits. Almonds gathered
B ,, 30 Sow barley (Upper Egypt)
Oct. 1 Lettuce and celery come up
, 3 The sap of trees recedes
,, 4 Great abundance of small fishes
,, 8 General ripening and storing of fruit. Gather Henna
, 9 The leaves of trees begin to fall. Sow Winter vegetables
,, 10 Warm clothing should be worn

2nd Koptic Month, BABEH.

Oct. 12 Cut reeds for matting
,, 14 General cultivation of lands begins. Sesame harvest
, 15 Rice harvest
,, 17 Coupling of cattle, sheep & goats
,, 18 Sowing of millet, flax & saffron
B 1 ,, 19 Sowing of barley and Bersim
,, 21 Ebony is cut
,, 23 Abundance of quails
,, 25 Beginning of mists and fogs. Dress more warmly
,, 27 Wood now cut remains sound
,, 29 Plant onions, garlic & asparagus
Nov. 4 Cut Sudan beans
W ,, 6 Sowing of wheat (Lower Egypt). Sow lentils, lupins & chickpeas
,, 8 Good season for preserving fruit
,, 9 Begin to sow beans

3rd Koptic Month, HATUR.

Nov. 12 Sowing of poppies, cumin and corriander
,, 13 Flax and hemp come up
,, 14 Departure of birds of passage
,, 15 Pull up cotton plants
,, 16 Sugar-cane for sale
,, 19 Abundance of bananas
,, 21 Send sheep to pasture
D ,, 22 Harvest of durah
,, 23 Radish seed pressed for oil
W 1 ,, 25 Sow fennel. End of sowing lentils, chickpeas and lupins
,, 27 Sow fenugreek
Dec. 1 Ripening of chestnuts. Appearance of winter vegetables
,, 3 Horses sent to green pasture
,, 4 Balsam tree cut for oil
,, 6 Olives pressed for oil. Sowing of safflower

4th Koptic Month, KIYAHK.

Dec. 11 First cutting of clover
,, 13 Lambing season
,, 22 End of Autumn
P ,, 24 Manuring of fields. End of late rice harvest. Season for transplanting large trees
,, 25 Christmas of the Franks
,, 26 Ripening of citrons
,, 31 Foaling season of camels

1901.

P 1 Jan. 1 Pruning of vines.
,, 2 Abundance of sugar-cane cut for pressing
,, 3 Swarming of bees
,, 5 End of sowing poppies
,, 7 The ostrich lays eggs

5th Koptic Month, TUBEH.

Jan. 9 Gathering of oranges
,, 11 Tamarinds gathered
P 2 ,, 14 End of pruning vines
,, 19 Sow native tobacco
,, 21 Pull carrots and colocasia
,, 24 Irrigate winter crops and trees
P 3 ,, 25 Transplant date-palms and young trees
P 4 ,, 26 The sap of trees begins to ascend
,, 27 Good season for making dresses
,, 29 End of Sowing safflower. Gather seed of onion
Feb. 2 Foaling of high-bred camels
,, 5 Clover ripens. Goats in heat
P 5 ,, 6 Planting of Henna
,, 7 Plant walnut and peach

6th Koptic Month, AMSHIR.

Feb. 9 Sow early cotton
P 6 ,, 10 Planting of roses, jasmine and most flowering plants
,, 13 Plant vines and pomegranates
,, 25 Early beans gathered
,, 27 Sow native cotton
Mar. 2 Season of Mukti cucumbers
P 7 ,, 3 End of season for planting trees
P 8 ,, 5 Begin to plant sugar-cane
,, 9 Abundance of waterfowl

7th Koptic M'th, BARMAHAT

1901.
Mar. 10 Begin quail shooting
,, 13 Season for culture of silkworms. Mulberry in leaf
C ,, 18 Sow Indian cotton
D 1 ,, Sow summer durah
,, 15 Cattle to be taken from clover. Sow early sesame
,, 19 Gathering of flax and hemp
,, 20 Sowing of indigo
,, 22 Beginning of Spring
,, 24 Pull up flax
,, 30 Sow cumin
,, 31 Gather fennel seed
Apl. 1 Sow native cotton
,, 2 Begin wheat harvest
,, 3 The silkworm begins to spin
,, 6 Sow egg-plant and water-melon

8th Koptic M'th, BARMUDEH

Apl. 11 Pressing of balsam oil
,, 12 Sowing of rice
D 2 ,, 13 End of summer durah sowing
,, 14 Season of chickpeas
P 9 ,, 15 End of planting sugar-cane
C 1 ,, 16 End of sowing Indian cotton
P 10 ,, 17 End of small planting
,, 19 Season of radishes
,, 21 End of quail shooting, Cairo
B 3 ,, 22 Beginning of barley harvest
,, 23 Coupling of camels
,, 30 End of large sowing
W 2 May 2 Wheat harvest (Lower Egypt)
,, 3 End of sowing rice and indigo. Plant Henna
C 2 ,, 5 End of sowing native cotton
,, 7 Thin clothing should be worn
,, 8 Mating season of ostriches. Begin to gather poppies

9th Koptic M'th, BASHANS.

May 9 Fertilization of the date-palm
W 3 ,, 12 End of late wheat harvest
,, 14 Gather balsam and apricots
,, 16 End of sowing Sudan beans
,, 17 Clear weeds from rice fields
,, 18 End of sowing sesame Safflower gathered
,, 19 Ripening of mulberries
,, 21 Plant colcasia. End of sowing indigo. ZEMZEM well filled
,, 27 Ripening of plums
,, 28 Abundance of apricots

10th Koptic Month, BAUNEH.

June 8 Miasma exhaled by Nile
,, 14 Abundance of water-melons
,, 15 End of sowing sesame
,, 16 Season for collecting honey
,, 17 Avoid drinking Nile 15 days
,, 24 Simum winds (70 days) begins
,, 27 Walnut fruit formed
,, 28 Figs and grapes ripen
July 1 End of gathering safflower
,, 2 Peaches and pears abundant
,, 4 Rise of Nile declared

11th Koptic Month, ABIB.

D 3 July 12 Sow Syrian durah
,, 14 Season of grapes
,, 16 Abundance of cactus fruit
,, 17 Sow early onions
,, 19 Soaking of flax
D 4 ,, 20 End of sowing rice. Cut durah
D 5 ,, 22 Sow celery, spinach, parsley, durah and gargir
,, 25 Heliacal rising of Sirius
,, 28 Chicory sown
,, 29 Mustard seed gathered
,, 31 Grapes pressed for vinegar (wine). Gather fennel seed
Aug. 1 Ripening of dates in the Hedjaz
,, 2 Storing of water-melons
D 6 ,, 4 Sow autumn durah
,, 5 Sowing of vegetables
,, 6 Opening of Upper Reservoirs

12th Koptic Month, MISREH.

Aug. 11 Abundance of water-melons
,, 12 Ripening of pistaccio
,, 13 Radish and native carrot sown
,, 14 Beginning of cotton harvest
,, 15 Plant narcissus bulbs
,, 20 Ripening of pomegranates
D 7 ,, 30 End of sowing autumn durah
Sept. 1 Sowing of turnip and beetroot
,, 2 Gathering of acorns

EIYĀM EN-NĀSI, 1617.

Sept. 6 First of the Nasi
,, 7 SEPARATE EWES FROM RAMS
,, 8 Spawning of fishes
,, 10 Last of Nasi

Five inter-calary (Nasi) days added in ordinary years, but in Leap Years a sixth day is added, without the Gregorian adjustment in Centuries, hence the present Koptic Calendar (like the Russian) has drifted from the Equinox.—M.B.C.

We may thus see that the great purpose of the Pyramids and subsequently the Almanac was to indicate precise Times and Seasons for Agricultural Operations. The minor sub-divisions into weeks, months and Festival Periods were of less importance, but now that Civilization has so far advanced that economies of Time, Labour and Trouble are called for on every hand, readers may fairly be asked (so far as they approve) to do all in their power to advocate the Rationalization of our Almanac as herein suggested.

We should remember that although we are now so lavishly supplied with Almanacs, the Ancient people had through many generations very carefully to seek out their data from nature, and develop a system of time upon which they spent such efforts that we, having benefited thereby, should more highly prize their work, and willingly take up our share in the work of amending the standard Calendar, to more perfectly sub-divide the Year in accordance with the growing needs of our own and future generations.

The development of Egyptian Zodiacs and Almanacs was most rigidly kept secret through many generations, but ultimately they were sculptured in the Tombs of the Kings—Karnack, Denderah, etc., Temples – showing the supreme importance that the Egyptians attached to improving their Almanacs during thousands of years.

The Koptic Calendar still continues the Ancient Egyptian Year of 12 *months containing* 30 *days each, with* 5 *days added after the* 12*th month in ordinary years, and a* 6*th day added in Leap Year.—Its simple Leap Year adjustment without the Gregorian rectifications at the centuries (e.g., Leap-Day omitted in* 1900) *has drifted the Egyptian, like the Russian and Greek Calendars, from our Calendar dates.*

But as the Egyptian Year 1617 (our 1901) began on September 11th (*i.e.*, 12 days **before** the then current Equinox on September 23rd), whereas the Russian and Greek Almanacs now show corresponding dates 13 days **after** our Almanacs, the combined difference of 25 days × 128 years per Pyramid shadow, day record lost = 3,200 years — 1900 = about 1300 B.C. (+ 1,536 years as per next paragraph) as the approximate date when the Egyptians lost trace of, or abandoned, their Pyramid Observations of the Sun by its meridian shadow lengths, either because the priests were exterminated or baffled by the Southward trend of "Changing Latitude," which caused the shortest shadow to fall when the Sun was (As 5,000 years : 3,200 years :: 7·1° : 4·5° as compared with the Great Pyramid's present 7·1° deflection from the Equinoxial Angle at its foundation 5,000 years ago) = 4·5° from the Equinox, which, applied to the Pyramid's essential Equinoxial Data, curiously enough again dates back from September 23rd to the 11th, as reference to the Sun's then Declination in "Whittaker's" or any Astronomical or Nautical Almanac will prove.

The 12 days thus pre-dated by the Pyramid's shadow multiplied by the 128 years per day (*vide* page 81) = 1,536 years, which added to

the 1300 B.C. previously computed, indicates 2836 B.C. as the approximate date when the Pyramid Priests appear to have been massacred by the invading "Hyksos," otherwise named "Shepherd Kings," who thus opened that way for Syrian travellers into Egypt by which Abraham and others later entered, and whereby probably the early Babylonians and Chaldeans acquired such truer knowledge from Egyptian records as stimulated their Almanac zeal and led to their later success in Astronomic research.

That date of 2836 B.C. at its best is only a crude approximation, as not only human defective Almanac records may have varied the Chronological records, but these investigations thus far convince me that the intervening path of Polar Progression then, as now, "Changing Latitude," was not directly North up the Great Pyramid's Meridian, but became curved and also varied in speed owing to the varying force exerted directly by the growing force of the Gulf Stream as it melted and forced back the Polar Ice, whilst that speed would also be accelerated as the Southward trend of Latitude was indirectly helped by the removal of the stupendous weight of Ice, as the warming climate increasingly melted and forced back the Polar Ice-Cap from Northern America and North-West Europe, as I will shortly explain.

Though great interest attaches to the admirably simple means of measuring the Pyramid's Equinoxial noon shadow on the Meridian Rod, to measure the Length of the Year and disclose that great Yearly renewing cycle of Nature to humanity, I submit that the photographs of that method on page 78a reveal to us the infinitely greater course of Climatic Changes which the whole Earth seems undergoing, to gradually fallow or rest its surface in Desert or Ocean Zones, to be renewed in the Prolific Tropical Zones where Coal strata, etc., are laid, or in the Fertile Temperate Zones where mankind develop to the greatest vigour.

By that vast unrelenting Cycle of the Earth, Climates are being changed in varying degrees to differently placed races of mankind, who are being steadily acclimatized or weakened in great masses affecting the destinies of nations, by that great turning motion of the Earth around its core, which I have named "Changing Latitude."

Special attention is directed to the most significant fact that the Great Pyramid's Shadow now disappears on March 3rd, as the lower photograph shows the Great Pyramid's March 2nd Noon Shadow distinctly upon the Meridian Rod at a distance of 4 ft. (recorded by the pebbles on the Rod) from the original Equinoxial Slope, clearly evidenced by the original casing Stone, from the corner of which the Meridian Rod is laid due North.

The lower photograph was taken at Noon on March 2nd, 1902, and the upper photograph of the same place and objects was obtained from a similar position at the following Noon on March 3rd, **when the Sun showed a declination of 7·1° and the Shadow had fore-shortened over 4 ft. and altogether vanished for the Summer half of the year.**

But mark the distinct difference of 18 days now intervening between March 3rd and the Equinoxial Day, which falls on or about March 21st.

We have seen from the Astronomical data, facts and arguments already considered, how inevitable it was that the early Egyptians must have striven to derive the true Equinoxial Slope as the prime essential factor required to perfect their Observatory.

Therefore after all their protracted efforts directed with the supreme care which the whole series of Pyramids so forcibly demonstrates, we cannot conceive it possible that they could have got their cherished Slope wrong to the extent of that 7·1° difference, which the Sun's Elevation below the Equator on March 3rd now so positively proves.

The only possible explanation of that difference is clearly unmistakable. That 7·1° difference between the present Elevation of the Sun and its former Equinoxial Elevation so precisely and inexorably registered by the series of Pyramid Slopes about 5,000 years ago, must have been steadily developed during that long period by the silent but all powerful gravitation of natural forces, as described beyond page 210.

Thus the implacable testimony of those mighty Pyramids positively indicates that momentous force which is "Changing Latitude," there emphatically registered, as having moved 7·1° in about 5,000 years, or AT THE RATE OF 450 ft. PER YEAR.

That significant change of 450 ft. per year in the location of the Polar Axis, which deflects the Latitude, appears to have been suspected from independent observations taken in America, as on page 307 of Professor Geo. Frederick Wright's "Man and the Glacial Period," he refers to the "Shifting of the Poles observed "as 450 ft. per year."

The "Change of Latitude" appears largely evidenced by facts deduced herein from the observations made at the Medum, Sakkarah, etc., Pyramids, and the Druidical Observatories of Stonehenge, Silbury, Maes-howe, etc.

It also seems strongly evidenced by geological facts, especially during the Glacial Period, which left its track of debris along that remarkable line of conspicuous Glacial Moraines traced right across the United States from Vancouver to New York, and thence across the South of England, Germany, and round by Moscow, up by the Ural Mountains towards Nova Zemlya, as approximately diagrammed on page 214.

Those accumulations of Glacial Moraines across America so remarkably resemble the like Moraines now being formed along the fringe of the Arctic Circle across Greenland, at about 23½° from the North Pole, that I was led to experiment with that 23½° measure along the track of the Moraines to see whether they could possibly have marked the former fringe of the Arctic Circle.

The surprising result indicated forcibly that, if that marked the former fringe of the Arctic Circle, then the North Pole appeared to have traversed along the North of the Arctic Ocean Coast-line of North America.

That became still more evident from the Southern bend of the Moraines across the Mississippi Valley, which very remarkably coincided with the Southern stretch of the great sea area of about 500,000 square miles, that is mistakenly minimised by being named Hudson's Bay.

The idea was thus forced upon my mind, that there might be a definite relation between the coast line and polar progression, which seemed confirmed by my further experiments tried, to show the deflections which probably resulted as the Polar location was drifted round South and then North-East of Greenland, where my Pyramid Experiments proved that it had been located during the period whilst the Pyramids were being built.

Space is too limited to allow of adequately epitomising even the evidences adduced from page 210 onwards, beyond the following :—

Capt. Scott, Lieut. Shackleton and others, during the recent "Discovery" expedition to the Ant-arctic, undeniably **"found traces of Tree-"ferns, etc.," in the South Polar rocks, "which "proved that the Ant-arctic region was once "Semi-Tropical."**—*Ex "Yorkshire Herald," February 24th*, 1905.

The geological facts of Tropical Flora found in Nova Zemlya, etc., as well as the Coal deposits within the Arctic Circle, prove that present Arctic Areas once enjoyed Tropical Climates, as no amount of depression could ever produce Coal, etc., within the Arctic Circle which through vast thousands of years has probably ranged $23\frac{1}{2}°$ from the Pole. Therefore parts of the present Arctic Area must have been under the Tropical Zone of heat in much lower Latitudes, which have Changed as the Earth has been slowly turned by the combined rolling force of the great ocean currents and the vast accumulations of Glacial Ice in Greenland, etc., which rises to about 10,000 ft. in thickness.

In the *Encyclopædia Britannica, Vol. X., page 217 b*, we read :—

"It has been estimated by Sir William Thomson "(now Lord Kelvin) that an elevation of 600 "feet over a tract of the Earth's surface 1,000 "miles square (*i.e.*, 1,000,000 square miles) and "10 miles in thickness, would only alter the "position of the principal Axis by one-third "of a second or 34 feet."

Seeing that the Greenland Ice-cap covers about the 1,000,000 square miles required for simple calculation, on that assumption of the Earth's crust being 10 miles thick, and that the 34 feet shift of Latitude would be proportionate to that 600 feet Elevation when applied by ratio to Greenland's 10,000 feet Ice-cap Elevation, we derive, as 600 ft. : 10,000 feet : : 34 ft. : **567 ft.** as a possible drift of Latitude per year.

But ice not being so heavy as rock-strata, whilst other Arctic Ice-caps and land counterpoise would partly reduce that pull of gravitation, it seems not unreasonable on existing evidence as to the high land elevations in Greenland, to assume in lieu of 10,000 feet of Ice an equivalent average land elevation of 8,000 feet, which would then work out to a Latitudinal Change of **453 feet per year.**

POLAR PROGRESSION "CHANGING LATITUDE."

A glance at a Map of the North Polar Regions shows clearly that the Great Ice Cap of Greenland, etc., covers nearly 1,000,000 square miles, and is accumulating to such a vast thickness that the excessively stupendous weight there so abnormally developed, must necessarily tend to turn the whole Earth, as the super-incumbent weight upon the Greenland, etc., area thus follows its natural tendency to gravitate towards the Celestial Equator.

That tendency is greatly accentuated by the fact that those great ice-weighted tracts of Green-land, Grant-land, Grinnell-land, etc., approach to within 7° of the North Pole, whereas the absence of corresponding land areas on the opposite side of the Pole fails to support any adequate counter-balance, as Eastern Siberia is nearly 20° distant from the present Polar location.

Therefore the pull of gravitation in the direction of Greenland must be rather greater than towards Behring's Straits, especially as the weight of the fresher Arctic Ocean is, bulk for bulk, about 1° less than that of the more saline Greenland Seas; in addition to which there is the vastly greater weight of table-land and ice upon the latter, which Dr. Nansen, when crossing the Southern portion in the year 1888, found to consist of an ice-covered plateau about 9,000 feet high. Further North the accumulating Ice-cap raises it higher like a growing ice-shield, to about 10,000 feet high.

Beyond that we have the valuable results of Dr. Nansen's Discoveries during his "Farthest North" Drift with the Fram, "when he proved the non-existence of the huge thick ice-cap which had until then been expected to be covering the Polar Sea Area, as he found that the ice-floes were only about 20 to 30 ft. thick (a fact also confirmed by Captain Scott's South Polar Expedition).

Further, that gravitating force is materially helped by the absence of any great thickness of Siberian Glacier Ice, even where the land stretches comparatively towards the Pole (as in the Taimur Peninsula), when compared with the thick ice-caps growing upon the higher Baffin's, etc., Lands, in corresponding Latitudes on the opposite side of the Pole.

The trend towards "Change of Latitude," thus evidenced by these investigations, is so surprising to most people that at first it appears incredible, because they have been taught to believe that Latitude is fixed, therefore I quote the following from the most generally accessible record of the *Encyclopædia Britannica, Vol. XXV., page* 744, to prove that the scientific reasoning of Mr. C. S. Chandler and others, as well as direct observations by Albrecht, of Berlin, and others, tend to bear out my conclusions. There, anent the probability of "Changing Latitude" and forces tending to cause it, we read :—

"The statical causes are deposits of snow "or ice slowly changing the position of the pole "of figure of the earth. For example, a deposit "of snow in Siberia would bring the equator "of figure of the earth a little nearer to Siberia "and throw the pole a little way from it, while "a deposit on the American Continent would "have the opposite effect. Owing to the

" approximate symmetry of the American and " Asiatic continents, it does not seem likely that " the inequality of snowfall would produce " an appreciable effect."

But I submit that the climatic information recently gained from Northern Siberia, proves that the extra Summer heat there derived from the hot drying desert winds of Central Asia maintaining a clearer atmosphere, and consequently ensuring more direct and powerful rays of Sunshine, not only leads to a much less snowfall than in Greenland, etc., but what is still more important, melts the snow in the Summer so that no great ice-cap can accumulate. Therefore the weight on the Greenland side preponderates increasingly, and will do so till checked by the melting of the Ice-cap along the fringe of the Arctic Circle as Greenland by its Southern trend emerges from beneath the Ice-cap.

Beyond that weight of ice there is the impetus given in the same direction by the vast Arctic flow of the great Siberian rivers and the deflective rolling force of the Gulf Stream and other oceanic currents—as also the prevailing Winds, about which the following quotation is made from the same authority.

" The dynamical causes are atmospheric and " oceanic current. Were these currents in- " variable, their only effect would be that the " Eulerian motion would not take place exactly " round the mean pole of figure, but round a " point slightly separated from it. But, as a " matter of fact, they are subject to an annual " variation. Hence the motion of the pole of " rotation is also subject to a similar variation."

From the *Encyclopædia Britannica, Vol. XXVIII., page* 364 *b*, after refuting Dr. Croll's theory, we read :—" The failure of the Astro- " nomic Theory to afford a solution of the " problem of the Ice-cap, leaves geologists once " more face to face with one of the most per- " plexing questions with which they have to deal. " At present no satisfactory explanation of it has " been offered."

I therefore submit this theory of " Changing Latitude " as evidenced by the Great Pyramid's Slope marking " Polar Progression," in support of which further evidences, derived since the foregoing was printed, are adduced below :—

Shortly before I was about to print off this last Section more definite evidence of " Changing Latitude " in the South-Western Sahara, has reached me from Lieut.-Colonel Elliot, R.E., the British Commissioner on the Anglo-French Commission sent to decide the Boundary of Northern Nigeria, which ranges along the South-Western edge of the Sahara Desert.

In a lecture to the Yorkshire Philosophical Society on the 26th January, 1905, Colonel Elliot said :—

" There appear to be evidences that the Desert " is extending to the Southward. One of these " seems to me the fact that the limits of certain " trees, notably the ' shea butter-tree ' and the " ' baobab," may almost be defined by Parallels " of Latitude.

" It looks as if the country was once well " forested, and that as the rainfall gradually " diminished, the trees requiring the most moisture " were the first to disappear, whilst the hardy " varieties continued to exist a while longer " under the changed conditions.

"To make this argument complete it would be "necessary to find remains of the other varieties "North of the Zones where they now exist. . . "I dare say some of the fossil roots and plants "which our French colleagues have brought "home may supply the proofs that are wanting.

"Stronger evidence than this, however, is to "be gained by a study of the Physical Features "of the country. There are no water-courses or "valleys drained by streams . . . The Dallul "Mauri is a fair example of what were evidently "old water-courses that are to be met with "throughout this region."

. . . . "That the rainfall was once "considerably greater than it is now, is evidenced "by a series of deep water-worn valleys that "divide up the laterite surface to the S.E. of "Tawa. These are about 100 to 200 feet deep, "and a mile wide in parts. They were evidently "river valleys, but like the Dullul Mauri, no "stream now drains their entire length . ."

"These deep valleys are interesting, too, in "another way. The Geological Section exposed "on their sides shows the laterite sheet to over-"lay Shales and Chalk. The latter is full of "fossils, a large number of echinoids among "them, which have been identified as belonging "to Eocene times. This is a point of considerable "importance, as it shows the vast extent of this "Eocene Sea, which, to judge by the similarity "of these fossils with those found in Northern "Africa, Arabia, Sind and Baluchistan, seem to "have included the Mediterranean, the Saharan "part of Africa, Egypt, Arabia and the N.W. of "India, and to have extended as far South as "Sokoto, if not further."

Colonel Elliot then describes what may be seen going on to-day amidst the pastoral tribes inhabiting the fringe of the Desert, who cut and burn the trees, and states "the process of "deforesting thus acts in a two-fold manner "on the drainage of the country. It diminishes "the rainfall and consequently the volume and "strength of the currents, and it lays bare the "soil to the depredations of the wind, which "thus readily gathers the material to block the "channels."

Then, as though conscious that those slight forces were very inadequate to satisfactorily explain the great Southward trend of the Desert, Colonel Elliot wisely inserts the following saving clause :—

"Before leaving this subject I must "guard myself against seeming to imply "that the influences I have just enumer-"ated are the ones that have mainly "operated to bring about the great change "that has taken place in these regions.

"I have merely been trying to put "before you my reasons for thinking that "the view that the Desert is extending "Southwards has every probability of "being correct."

"The vast sheets of Inland water (remains of "the Eocene Sea referred to above) must, "while they existed, have contributed very "largely to the Rainfall of the interior of Africa, "and the water-worn valleys were doubtless

" carved out in a great measure during their " time. Naturally as they dried, the climate and " conditions gradually changed."

Surely the prime question here suggested to thoughtful minds is, What has caused those great Inland Waters to dry up like those of the Dead Sea, Caspian Sea, Aral Sea, etc. ?

I (Cotsworth) respectfully submit that the answer to that question is unmistakably indicated by the present deflected Slope of the Great Pyramid, which incontestably proves that during the last 5,000 years North Africa has been trended 7·1° Southwards, as clearly established by that divergence from the original Equinoxial Slope of the Great Pyramid which there registered the Sun's Altitude on the Celestial Equator, at the central point of Astronomical Time still forming the basis of Observations for adjusting our Almanacs and the wonderful factors governing Astronomy.

As North Africa has thus been drifted South wards by those Agencies (enumerated from page 214 onwards), which, hinged on Gravitation, have progressively changed Polar Location, then it naturally and inevitably followed that the vast shallow inland waters there formerly covering Swampy Territory, were dried up as that area drifted Southwards into the Tropical heat which steadily evaporated the water, so aiding the Southern encroachment of the Arid Desert, from which the prevailing Northerly winds helped the Southern trend by drifting the Sahara sand and reducing the rainfall as Colonel Elliot described.

The article on the Sahara in the *Encyclopædia Britannica, Vol. XXI., page* 151·*c*, records :—

" Dr. Theobald Fischer and Dr. Oscar Fraas " agree in believing that the desiccation (of the " Sahara) has markedly increased in historic " times. Evidence derived from Ancient Monu- " ments, combined with the statements of " Herodotus and Pliny, are held to prove that " the Elephant, Rhinoceros and the Crocodile " existed in North Africa, where the environment " is now utterly alien, and on the other hand " the Camel is a late introduction."

The confirmatory evidences of Professor Maspero (Chief of the Government of Egypt's Antiquities Department) are worthy of our best attention.

On page 31 of his *Dawn of Civilization* we read " At the beginning of this (19th) century " the tree (Dom-palm) was common in Upper " Egypt, but is now becoming scarce, and we " are within measurable distance of the time " when its presence will be an exception North " of the 1st Cataract.

" Willows are decreasing in number, and the " Persea, one of the sacred trees of Ancient " Egypt, is now only found in gardens. None " of the remaining tree species are common " enough to grow in large clusters "—except the desert growing date palm. Hence Egyptian vegetation, like that of Syria, Arabia and the Southern Sahara, seems disappearing through the Southward trend of the Arid Climate so clearly evidenced by Colonel Elliot's observations and others herein recorded.

Again, on page 34, Professor Maspero refers to Ancient Egypt having been the habitat of "the elephant, giraffe and other animals, which "only now thrive far South. They had dis- "appeared at the beginning of Historic Times." The hippopotamus "continued to flourish until "the 13th century of our Era. The crocodile, "which came with it, has, like it also, been "compelled to beat a retreat." . . . . . "To-day no one knows of a single crocodile "existing below Aswan."—They all seem to have disappeared as the Desert climatic conditions advanced Southwards.

These and similar evidences ultimately convinced me that the Strata of the Earth's crust were continuously laid, as now, in like contemporary Zones of Climate, since deflected by the ever "Changing Latitude."

On page 636 a of the *Encyclopædia Britannica, Vol. XXV.*, we read this confirmation :—"We "may confidently assert that while geological "changes may quite possibly have taken place "on a gigantic scale in the earliest ages of the "Earth's existence, of which no geological "record remains, there is no proof that they "have ever done so since the period when the "very oldest of the stratified formations were "deposited."

Yet again on page 658 a, we read anent the supposed "life-zones" in stratified geology :— "But it is difficult to see how, for example, in "the Lower Lias, there could have been a "succession of prodigious intervals, when practi- "cally no sediment was laid down, and yet that "the strata should show no sign of contem- "poraneous disturbance, but succeed each other "as if they had been accumulated by one con- "tinuous process of deposit. It must be admitted "that the problem of life-zones in stratigraphical "geology has not yet been solved."

From the *Encyclopædia Britannica, Vol. XXV., page* 515 *a* we read this confirmation—

"The link forged in geologic ages never "seems to have been entirely broken, and "nothing has served to give emphasis to previous "evidence on this subject more then the Zim- "babwe discoveries of Theodore Bent," to which, however, we may now add the valuable discoveries of Dr. Nansen in the Greenland and Polar Areas, and Professor Geo. Fredk. Wright's significant search for glacial evidences across Northern Asia, proving that the Glacial-Ice-Cap or Arctic Circle did not range over there during our Glacial Period. All those tend to confirm what the 7·1° deflection of the Great Pyramid's Slope so definitely proves,—that the combined forces of the Polar currents and over-balancing weight of the superincumbent mass of the vast "Ice-Cap" about 10,000 feet thick over Greenland, are having an effect upon the Earth's Gravitation, which is slowly causing this newly-found progression of the Polar Location, which results in what I have termed "Changing Latitude."

That is still producing those ceaseless climatic changes of the Earth's surface which have been slowly moulding the Earth's surface since the dawn of the earliest Geological Times, without

those incredible, sudden and vast upheavals, which the imaginations of early Geologists —(based upon superficial investigations of scattered portions of the Earth's surface)— led us until now to believe were originated and developed by separate Geological Periods, during which an almost uniform climate was assumed to have prevailed all over the Earth: as exemplified in the great heat required to grow the Tropical Vegetation, when the great North American and European Coal Seams were laid during the so-called "Carboniferous Period"; and the warm climate under which the warm Ocean in ages later deposited our Limestone and Chalk strata during the so-called "Mesozoic Period."

I cannot possibly believe that the climatic conditions requisite for either of those Geological Periods prevailed simultaneously over all the now widely different Climatic Zones of the Earth's surface, because the stupendous facts disclosed by the geological investigations in China emphatically show the reverse order of stratification. Whereas our Coal is so far **below** the Limestone, in China Coal was deposited as it is there always found—**above** the great Limestone formation or intermingled with thin Limestone layers, as the following excerpt from page 17 of Vol. XXVII. of the *Encyclopædia Britannica* clearly shows :—

"**OVER the limestone formations there is "found a series of Carboniferous Strata almost "equally widely diffused . . . . In some "parts, as in Shansi, the seams of pure coal "are of great thickness, as much as 30 feet "or more, in others the beds are thin, and "separated by layers of limestone and argillaceous "strata . . . . . This is the largest coal-"field in China, and probably in the world, but "a similar sequence of strata is found prevailing "generally through Eastern Asia.**"

That significant fact of China's coal-seams being found **above** the Limestones, whereas the European and American coal-seams are reached so far **below** the Limestone strata, appears to form conclusive evidence which adds to the basis of my belief, that throughout the Geological Ages there has ever been on different parts of the Earth's surface continuous and contemporary Zones of Climate, ranged, as now, according to the Tropical, Temperate and Frigid Latitudes in which the strata were laid.

Further, when compared with North European and American stratification, those Chinese and other Asiatic, and like Australasian reversals (as instanced in the Australian Glacial Deposits now found covered up by very old strata), seem to prove not only that similar zones of climate co-existed throughout the geological ages as now, but those reversals also confirm my reasoning that the North Pole's course meandered round the South of Greenland when the Chinese coal strata were laid whilst China was a vast tropical swamp with luxurious vegetation in the Equatorial Zone, enjoying a climate similar to that experienced by the Islanders in the low-lying tracts of the Malay Archipelago.

That seems remarkably emphasised by the most portentous fact that both the respective coalfields of America and Europe are now 30° North of the Latitude where the respective Tropical Swamps of the Amazon and the Nile are now luxuriously growing and depositing vegetation for future coal-seams in that Tropical Zone, where I am convinced that all coal seams were laid.

Still more convincing is the incontrovertible fact that despite the 10° lower Latitude of the Amazon Swampy Zone and Pennsylvania coal-field, compared with the Nile Swamp Zone and British, French and German Coal-fields, we have in both cases a parallel directional deflection of about 30° West of North from their Equatorial Swamp bases of deposit, and a corresponding distance of about 3,000 miles deflection of Latitude towards the North-North-West in each case.

Broad areas along those 3,000 mile tracks would evidently be drifted later through those Zones of Equatorial Swamps, where later Coal Deposits, now at intermediate distances, would be laid on suitable tracts then above sea-level.

Therefore we may reasonably believe that bounteous nature has been far more lavish in her coal, etc., supply than we have hitherto imagined, as coal must likewise have been deposited under the Southern parts of the United States, as also under Southern France, Italy, etc., during the like gradual drift of those Territories through the Swampy Tropical Zone.

In that light, viewing the valley-like tract of the English Channel with coal-seams found on each side, we may rest assured that not only underneath the Channel, but also across Southern England, and probably extending over France, Italy and the Mediterranean Sea in the direction of Tripoli, coal will be found deposited in former geological plains and valleys divided by the Older Elevations of the Auvergne, Alps and Apennine Mountains.

The relentless agencies of Polar Ice, Ocean Currents, Winds, etc., collectively operating on the Earth's gravitation, have thus developed that prevalent phenomena which I have named "Changing Latitude," as it appears to be inexorably drifting the North Niger Territory to lower Latitudes and into Desert Zones, in conformity with the like changes of Latitude now traceable on the fringe of the Arabian, Syrian, Saharan, Arizonian and Mexican Deserts, so plainly evidenced by the continual drying up of the Sea of Aral, Caspian Sea, Dead Sea, Lake Chad, Salt Lake (U.S.A.) and Mexican Lakes, as they are being drifted Southwards.

Of course corresponding Changes of Latitude are progressing over the other parts of the Earth's Surface, but the extremely slow rate of rather over 1° per 1,000 years is so slight, and the traceable evidence so meagre, that they have only become apparent from long historical and geological records of Climatic Changes best seen along the Southern fringes of the Deserts in Northern Africa and America, but above all established by the most reliable and imperishable record of the Great Pyramid's Slope.

The " Change of Latitude " appears distinctly evidenced by the fact that in the great American Deserts of Arizona, etc., the sites of ancient civilizations are now found in those Desert Zones, although the corn-husks and materials in the debris of those Pueblo dwellings show that formerly that country was fertile and well watered, until the force of Changing Latitude drifted it into the Desert Zone.

The dried-up water channels, river beds, etc., now found in those deserts conclusively prove that great arid Climatic Changes have developed there during comparatively recent times.

Similarly the North of Australia and Queensland seem to be slowly entering the Southern Desert Zone as they, being located at the Antipodes of the Mid-Atlantic's Greenland Meridian, are correspondingly deflected Northwards.

My experiences with Professor Geo. Fredk. Wright's remarkable expedition through Syria and Palestine evidenced the same trend, as formerly fertile districts through which we passed were then in semi-desert condition, though the unmistakable witness borne by the very numerous derelict vine, fig tree and Olive " Terraces " proved the former productive rainfall and more luxuriant vegetation of that region, as Bible evidence clearly confirms.

Glacial Geologists naturally expected that when the Glacial ice-cap prevailed over Northern America and Europe, that the Arctic climate would have prevailed over Siberia, but the long and thorough search made through Manchuria, Siberia, Turkestan, etc., by Professor G. F. Wright and his son, proved that no such Glacial conditions prevailed in those regions, as no trace of Glacial Moraines could be found, nor Glacial Stones along the track of the Trans-Siberian Railway then being cut through likely moraine-like hills, etc.

Those valuable investigations by Professor Wright are detailed in his book " Asiatic Russia," and extracts therefrom, as also from his " Man and the Glacial Period " and " The Ice-age in North America " are shown from my page 214 onwards, therefore I need only here emphasize the most significant fact that his researches prove that the corresponding Latitudes of Asia did not experience a Glacial Period contemporary with that of Northern America and Europe.

That disproved the theory held by some scientists, that during the Glacial Period the Polar Ice-cap extended to about 40° from the Pole, covering Northern Asia as a counterpoise to the enormous Ice-sheet supposed to have simultaneously covered Northern Europe and America. Therefore it gives powerful support to the idea herein put forth that Polar ice-caps have always been approximately confined to within the $23\frac{1}{2}°$ of the Arctic Circle, but that the Polar Axis has been deflected along the North Coast of America and round the South of Greenland, along near the track of the present limit of drift ice passing Iceland and thence round by Spitzbergen, as mapped on page 214.

I submit that such Polar Progression has arisen from natural causes, amongst others being gravitation of the extra weight of the

Greenland Ice-cap, rolling force of the Gulf Stream, Great Siberian Rivers, etc., as already named herein.

The constant grinding of the Glacial Ice during past millenniums, together with the tremendous transporting power of icebergs, as seen in the vast accumulations making the Banks of Newfoundland and the extensive mud deposits which Dr. Nansen found all across the Arctic Ocean, added to the irregular Polar Progression, have slowly denuded the area now occupied by the Arctic Ocean, whilst the well-known bulged Equatorial Zone has been more largely added to by the vast accumulations of meteoric dust, etc., which naturally tend to gravitate towards the stronger Equatorial attraction.

The greater speed of rotation, pull of gravity and centrifugal force exerted by the Equatorial bulge, now appear to check or limit the Polar Range nearer to the present bounds of the Arctic Circle, but as it will probably take centuries of investigation to trace the relative powers of those forces, and accurately outline the past path of the Pole, we may be content to believe that when our Glacial Period prevailed, the North Pole was East of Greenland, $23\frac{1}{2}°$ from which the Asiatic side of the Arctic Circle would then fringe about the present site of the Pole, when Central Siberia, instead of having the existing Latitude of 60°, would be about $36\frac{1}{2}°$ or where Mid-China and Japan now enjoy the warmer climate which the Russians and Siberians want.

Hence Siberia did not then experience the Glacial Period towards which now it appears to be approaching, as it is gradually becoming colder by being deflected towards the Polar Zone.

Although this "Change of Latitude" during the last 5,000 years only appears to be at the rate of $7{\cdot}1° \div 5{,}000 = {\cdot}0014°$ per year, or about one-tenth of the hitherto regarded almost imperceptible change caused by the "Precession of the Equinoxes," the change during the Historic Period tends to confirm that great factor which seems to be vitally affecting the destinies of all nations.

Modern historians have long been puzzled by the repeated references made by such Ancient Historians as Herodotus, Josephus, etc., to the severe Winters formerly experienced by the Assyrians, Babylonians and Egyptians, during Ancient Wars, when severe frosts and snow paralysed military operations in Syria, where warmer climatic conditions now prevail—indeed, Professor Wright's party and myself rode through that region between Damascus and the South of the Dead Sea during the mid-winter of 1900, when we experienced warmer weather than the usual English Summer.

The explanation is apparent from the Great Pyramid's Slope, which conclusively proves that when it was built the Latitude of that region was $7{\cdot}1°$ more than at present. Egyptian Memphis now near Cairo was then in Latitude $37{\cdot}1°$, where Asia Minor now ranges, whilst Syria would then be where the Caucasus Regions now experience those rigorous Winters formerly experienced in Syria.

Similarly in Greek and Roman History we find that Pliny and earlier reliable Historians record that wars against the races North of the Danube were purposely delayed until the severe Winter weather froze over the Danube, so that war material, horses and men could be transported over that then great unbridged river, which now does not experience such rigorous Winters, because it is now several degrees further South, and therefore enjoys a warmer climate than when it was in the Latitude now experienced by the present North Austrian or South German Territory.

Hence I believe that when the Egyptians, Greeks and Romans were vigorous Races, they enjoyed those more bracing Northern climates.

We are to-day confronted with the fact that the former powerful Races of the Greeks, Romans, Turks, Spaniards, and those ancient peoples of Carthage, etc., along the Southern Mediterranean have decayed or are decaying, as their countries have thus been drifting into their present warmer enervating Latitudes, because their blood thus becomes thinned as European residents in Egypt, India, etc., find to their cost. I was fortunately enabled to trace that reason in Italy by the fur-coated travellers there seen during January in trains and at railway stations, when I neither felt cold nor needed even a light overcoat whilst returning from warm Egypt.

That "Change of Latitude" explains why the Southern Races of Europe are decaying. The reason is less in their mode of life than in the steadily increasing heat developed as they are passing into lower Latitudes, where lassitude slowly overcomes the desire for vigorous effort, so generations weaken and standards of life are lowered.

Similar confirmatory evidence is forthcoming from the lessened vigour of the Mexicans, who, during the erection of their Pyramids, enjoyed a more Northerly climate.

The researches of Dr. Baum's (Washington, U.S.A.) Expedition of Archæologists and other Scientists to the South Western States of Arizona, New Mexico, Texas, and the evidences of the "Staked Plain" between the two latter, show that former civilizations there thrived where food cannot now be produced, because that territory has been drifted Southwards by "Changing Latitude," into that arid Zone.

Even during the last Century the change of climate seems perceptible, as the rigors of Winter experienced during Napoleon's retreat from Moscow in 1812 are not now experienced, and old people as well as records state that our Winters are not so severe as during the early part of the last century. The change has been so slow that it is barely discernible.

The change in Latitude so forcibly evidenced by the Great Pyramid's Slope and confirmed by the foregoing human and physical proofs, leads me to believe that when the Egyptians, Greeks, Romans, etc., were powerful they enjoyed a more invigorating Northern Climate, the change from which has been so slow as to be almost imperceptible.

CHANGING LATITUDES AFFECTING NATIONS BY DEFLECTING CLIMATES.

It has been necessary to thus devote considerable space to prove the evidences of "Changing Latitude," to establish my conclusion that, though the Great Pyramid now shows 7·1° shadow difference from the present Equinoxial Slope of the Sun, the Slope of the Pyramid truly registered the ancient Equinoxial Slope of the Sun when the Pyramid was built, and therefore establishes the momentous fact that during the last 5,000 years the Earth has changed its Latitude along that Meridian by 7·1° and is thus successively changing, resting and renewing the whole World's surface through that marvellous recreative force so wisely designed in Nature by the beneficent Creator.

The constantly increasing overbalancing weight of the Greenland Ice-cap, and Iceberg-carried material, apparently account for the gravitating force tending to drift the Latitude during recent millenniums so that the Great Pyramid's Meridian Line does not now show change of orientation, though it is probable that it is merely a coincidence that the Pyramid was built when the Meridian Line was then in the direction of the present Polar location, as later the Polar track probably crossed slightly over the existing Meridian Line and may now be recrossing it obliquely, at such a slow rate as can only be measured by comparing precise observations over hundreds or thousands of years.

Prominence has been given to this mighty Earth-rolling force, evinced by slowly "Changing Latitude," so unexpectedly made manifest by the 7·1° deflection of the Great Pyramid's Slope from its original Equinoxial Angle, because the magnitude of that force seems so far reaching, and establishes a basis of knowledge of the Earth's history and trend so vital to humanity, that has scarcely been exceeded in world-wide importance, since that most vital factor of knowledge "the Length of the Year" was so laboriously discovered by the Pyramid Builders and Observers at the same Great Pyramid, over 5,000 years ago.

Its discovery thus seems inseparably connected with the Pyramid origin of the Almanac, and is therefore rightly recorded here, because it was first disclosed by means of these researches into the Almanac purpose of the Pyramids, which led to the conclusive photographs on page 78 a being taken, and subsequent investigations and reasoning being applied; hence in the cause of truth I felt bound to here record the fact.

Realising that true reasoning is best established by independent observation of facts, I felt impelled to follow out individual trends of thought in all my early experiments with Sighting Staffs, Shadow Poles, etc., and it was only after the strongest probabilities were thus forced upon my mind, that I referred to such standard authorities as those necessarily quoted from the *Encyclopædia Britannica*, etc., to test the reality of my conclusions.

That probably explains why these explanations have not been earlier derived by other Pyramid Investigators during the Christian Era, who appear to have followed and been trammelled by the totally inadequate Tomb Theory of their

ancestors, with similar results to those which developed inflexibility of thought, and prevented the reasoning of the astronomers following Ptolemy during over 1,400 years, from discovering that the Earth revolves upon its axis, until Tycho Brahe applied his individuality by constructing his original Observatory with its holes and simple lines of string, etc., through directing which his great discovery was made.

WHY was not CHANGING LATITUDE discerned before?

It seems to have been impossible to trace the evolution of this potential change in Polar Location which deflects the Latitude, until the following four links of essential evidence could be completed and chained together :—

1. Past researches of Geologists proving the structure of the Earth's crust, especially in the Glacial Section.
2. Professor G. Frederick Wright's researches across Northern Asia disproved the former Geological and Astronomic theory, that during the North American and European Ice-Age the Glacial Ice and Deposits had extended over Siberia. The absence of Siberian Glacial Deposits proved that the Ice-cap did not there counterbalance the vast weight of American, Greenland and European Glacial Ice.
3. Dr. Nansen's Polar Explorations proved the Open Sea Area around the Pole and its relatively thin Ice-cap when compared with Greenland, etc., which had previously been regarded as typifying Polar ice conditions.
4. The conclusive evidence of Changing Latitude as now established by this Almanac study of the Great Pyramid's Slope, that enables us to gauge both the speed and direction of Polar change, which is at present so exceedingly small as to be almost imperceptible even with modern astronomical instruments, and only evident when measured by a huge fixed gauge, over a very long period like the 5,000 years' age of the Pyramids.

The remarkable erratic-coast-deflected-course of Polar Progression, as per page 214, appears so unexpectedly different from the mathematical cycle or "nutation" which the almost Universal "copied" system of reasoning had led some Scientists to anticipate, that it could not be reasoned out until those records and the prime factor of Polar Progressive speed and direction were ascertained by such researches, culminating in proofs of the original Equinoxial Slope of the Pyramid as then essential for use in precise observations, though since deflected by "Changing Latitude" which is thereby proved and measured.

Too many of our Scientists have got into Academic grooves of thought, instead of pursuing independent lines of research into Nature's record. They have been too intent upon observing rigid ideals of pure mathematics and uniformitarian ideas of rock

formation, as though the all-wise Creator would have inexorably evolved the Earth's Crust in regular layers as we erect buildings: whereas the Eternal Wisdom, in accordance with that beneficent design which directs the Universe, simply worked through Natural Forces to ensure that wonderful renewal of the Earth's fertility by climatic changes which, being on such a vast scale immensely beyond the length of the Seasons or human records, men have hitherto failed to realise,—just as the rigid Egyptian Geometric thought of the great Ptolemy prevented himself and his followers during 1,400 years from discerning those mighty Universal Laws of Astronomy, which the untrammelled minds of Copernicus, Tycho Brahe, Kepler, Newton and others were able to find from freer Studies of Natural Phenomena.

PTOLEMY, the Egyptian-Greek Astronomer, whose observations extended from 127 to 151 A.D., held that the Earth was stationary, and his great work the "Almagest" became regarded by all learned men and students as the standard or model for scientific investigation, because of the genius with which it explained the Astronomical problems in accordance with pure Mathematics. His treatise named the "Almagest" explained the motions of the Sun, Moon, Planets, and Stars, as revolving in exact circles AROUND THE EARTH. It thus came to be regarded as the Scientific "Bible" which none dare question.—Hence followed that 1,400 years' period of Stagnation in Astronomical research, which the heroic labours of Copernicus disturbed in the year 1543, when his explanation of the motions of the Earth and Planets AROUND THE SUN, infused that new vigorous life into Astronomic Research, which shortly after led Tycho Brahe to prove that important fact by his practical observations and experiments.

The great Sir Isaac Newton and others continued the work which resulted in vast benefits to humanity, by developing improved Nautical, etc., Almanacs with better data for observations to facilitate Ocean Navigation, etc.

Most of our college-trained Archæologists, Astronomers, etc., have, through so many generations, been taught to believe that the earlier races of men could easily derive sufficient knowledge of the Seasons by merely sighting the Amplitude of the Rising and Setting Sun, that they have tacitly accepted that vague statement, without exercising the simple practical test of trying to thereby locate even the most obvious terminal dates of Mid-Summer and Mid-Winter (Yuletide), without applying present Almanac Knowledge.

If they could temporarily put aside our Almanac ideas of fixed dates, and would begin early in June and December to observe the

Sun's Rising and Setting Points along the horizon, they could not thereby locate and differentiate those Solstice days beyond a shrewd guess. It would take them many years to thereby determine the Year's length, even if they used the ordinary instruments employed during the last century, and I have little doubt but that the Druid Students at Stonehenge, Old Sarum, etc., Universities over 3,000 years ago, were able to give truer detailed readings than our students could now do with the unaided eye.

Observers would thus, like myself, become convinced that such crude methods could not meet the necessary agricultural requirements of earlier civilizations, and realise that pre-historic peoples advancing in culture to more settled social life, were compelled to raise those mighty mounds like Silbury, Maes-howe, etc., with Monoliths like those of Aldborough, and Stone Circles such as Stenness, Kendal, Stonehenge, Carnac in Brittany, etc., as fixed Observatories with their registering alignments and pointing stones, to thereby determine the Almanac Seasons for Agricultural, Governmental, Social, etc., purposes.

Vast numbers of University men have passed the Obelisks in Egypt, Rome, Paris, Berlin, New York, etc., merely thinking that those erections were public ornaments or monuments, without conceiving any idea of the great utility and absolute need in Ancient Times, of that original Almanac and daily time-recording object which the Obelisk shadows still so conspicuously display.

Similarly, millions of thoughtful people, so long dependent upon our Almanac, clock and watch system of time, have passed the old Sundials which were so commonly used until 100 years ago, without any conception of the interesting fact, that Sundials manifest the Gnomonic or Shadow System of Time which originated at the Pyramids and was developed and refined during thousands of years, until the mathematical genius of Euclid and others perfected the scientific study of those radiating hour-lines, which simply register hourly the southern edges of the shadow cast from the projecting "style" of the Dial, in the same way that the Slopes of the Pyramids did by their sharp deflecting arris-ridges which join the apex with the corners of each Pyramid as shown on page 50.

Thoughtful observers may easily see that the "style" of the Sundial serves as a miniature Pyramid, casting a proportionate shadow, and is so clearly traceable back to its pyramid origin, as indicated by the oldest Sundial known.

As Pyramids could not be transported, the ingenuity of the most skilful ancient minds was induced by growing necessity to produce those portable Sundials with their mystic lines based upon mathematical science applied to the Sun's movements, which form the most striking features of Almanacs as far as can be traced back to the earliest records.

The Almanacs of the 18th and early 19th Centuries teem with those dialling diagrams and problems which exercised the thoughts of our Ancestors.

Probably advocates will come forward trying to disprove my conclusions, but all their fulminations will never enable them to move that inexorable 7·1" record of the Great Pyramid's Slope, nor yet the consequent deflection of its shadow, which should lead our great thinkers to amend such of their theories as are affected by this newly-observed force of "Changing Latitude," still so silently and slowly, yet persistently, effecting climatic changes so vital to the whole Human Race.

May we not rightly ask our Scientific Friends to adjust their theories to accord with the most conspicuous geological facts so boldly evidenced on page 214 by the Glacial Moraine track of the Arctic Circle across America and Europe, and the immutable further record of "Changing Latitude" so distinctly manifested by the Great Pyramid's Slope, as also the accumulating evidences from Historic Records, recent and current research into Geological and physical facts now being so significantly disclosed in various parts of the World?

As the hardly perceptible and unsuspected Change of Latitude deflected the Slopes of the earlier Pyramids, later generations of pyramid builders naturally concluded that those Slopes were defective, and that their ancestors had not been such careful observers as they (most generations egotistically think that), so new Pyramids of then more perfect Slopes would be successively attempted, and gradually worked further North as the Latitude changed towards the South, as we find almost all through the series, until the mighty Great Pyramid's 6,000,000 tons were reared to cast that great Shadow, which by its wide 4·45 ft. Gauge enabled its Observers to trace the year's length, for the noble purpose of recording Almanac Times with all their manifold and constantly increasing uses.

Though different Cults may in some cases have erected rare contemporary Pyramids, or amended and re-sloped others, and finally some Pharoahs were allowed to utilize obsolete Pyramids as Tombs, we cannot believe the preposterous theory that those mightiest works were ever erected for the cold purpose of perpetuating the vain glory of any monarch after death.

Knowing that the stupendous Great Pyramid alone contains more stone, etc., material than all the cathedrals, churches, chapels, schools, etc., erected in England since the time of Christ, how can we think it possible that any body of men could ever have been so foolish as to waste their energies upon such a huge work merely for a Tomb, seeing that all men come down to one dead-level to meet their God at death?

No! The Pyramids, huge pre-historic Mounds, like Silbury, Maes-howe, Kokh, etc., with the Vertical Stones, Druidical Circles, etc., so persistently erected by early men, were generally designed to meet the greatest need of men toward gaining assured food supplies, by noting the right ploughing, sowing, etc., times from those simple observatories.

On my way to Egypt, in November, 1900, I voyaged in the "P. and O." S.S. "Osiris" from Brindisi (41° N. Lat.) to Port Said (31°), and whilst taking noon-day observations of

the 10° increasing Elevation of the Sun as that 10° to a lower Latitude was traversed, Mr. J. A. Devenish, the Engineer to the Government of India for the Rajputana Province, asked what I was doing?

After explaining that I was trying to study the Sun by simple means, as the ancient Egyptians appeared to have done, because I was writing a book dealing with the Pyramids of Egypt, he became interested, and accompanying me to the cabin (where printed proofs of most of this book were being revised as my time allowed) Mr. Devenish asked to be allowed to read the proofs, and was so interested that he read them through during our three days' voyage.

He expressed a firm conviction that my outlined use of the "Inclined Plane" was obviously the method which the Pyramid Builders must have employed to raise those huge stones, though until he then read my idea that it was only by use of the Inclined Plane that they could reach such heights, **and that the shape of the Pyramid was thereby determined,** he had not been able to satisfactorily understand how they built it, despite the fact that he had carefully studied Eastern engineering methods and was specially interested in lifting large stones. Further, as he had so often passed within sight of the Pyramids when sailing to and from India, he had often wondered how the Pyramid stones were raised.

Mr. Devenish was so pleased, that he promised to have a model made and sent free to me when he got back to India. That he very kindly did, and it is here reproduced, showing how the men under his control now so easily and quickly lift large stones, weighing up to 7 or 8 tons each.

Mr. Devenish explained that one of his responsibilities was to build large court houses in India, where the aim was to keep the court cool by shutting out the torrid Sun.

With that object they used the longest thick slabs possible to form the roof without interior pillars or other bearers.—In his letter, dated 10th February, 1902, from Bharatpur Agency, Rajputana, India, the record is clear that "**We can lift slabs 25 ft. span by 2 ft. wide and 2 ft. thick,**" weighing about 8 tons, "**in that way and put them in their places in the roof.**"

That simple method Mr. Devenish and other of the best European Engineers have had to learn by practical experience from the Native Engineers of the East, because that Eastern method of lifting, where labour is plentiful, is cheaper and quicker than the European mode.

I afterwards learnt that Mr. Devenish had made an interesting study of ancient engineering methods, and wisely had models made of the different methods he discovered. That unique collection is now at his parental home near London, and very interesting to all who see it.

Mr. Devenish repeatedly wrote for my book, which was extending as my limited time permitted; his concluding words were "**I should "be very interested to get a copy of your Pyramid "Researches and Calendar Reform Pamphlet, "and to hear how your visit to Egypt confirmed "them.**"

HOW THE PYRAMID'S STONES WERE RAISED.

When I arrived at the Pyramids, that willing faithful guide, Aly Gabry, at my urgent request took me across the desert to Dashoor and Sakkarah, when we fortunately met Professor Maspero's men moving the granite Apex of a Pyramid over the desert for the Gizeh Museum. —Naturally, I was delighted to see how they laid thick wood planks over the levelled sand and trundled the stone along over iron rollers as obviously the simplest way. But when we got back to the Great Pyramid, I could not bring myself to believe that those mighty builders would ever have been so foolish as to waste their labour by the elaborate methods which great authorities like Professor Petrie, Sir Benjamin Baker, etc., support on the evidence of the small boss-marks upon the top sides of the stones.

Shortly stated, their theory is that the over 2,300,000 stones of the Pyramid were rocked up by levers and wedges, but as it would take about a month to get a stone up to the top in that way, I cannot accept that theory as likely.

Whilst giving all due deference to such eminent authorities, I feel a right to independent thought and responsibility for what I believe.

[Great minds have sometimes less aptitude for the solution of plain problems than simple men, as witnessed by Sir Isaac Newton's thoughtful boring of a small hole through his study door for the kitten which the cat brought, when obviously the large hole previously there for the cat would have sufficed for the kitten.

Moreover, experience has proved several similar cases to me.

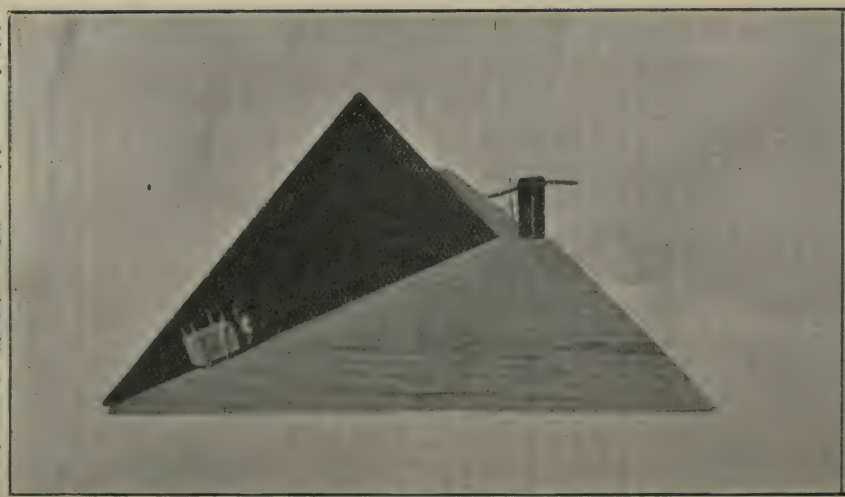
Whilst Manager for the Trent Navigation, my Boat Foreman was an old Naval man of resource, who solved the difficulty of getting a dredger through the Soar Navigation Locks for which it was too long, after successive engineers had failed.—Plain Tom Barratt simply got his men to lift up the tail gates and turn them outwards and lash them to the posts, and the dredger passed smoothly through.

Similarly when the New York Fire Brigade, at a fire, had the fire-hose across the railway, stopping the trains, which accumulated and aggravated the passengers, none of the Fire Brigade officers or engineers thought of the simple expedient which a youth named Saxby, of New Jersey, put into force at once by merely removing part of the ballast from under the railway, when, at his suggestion, the firemen put the fire-hose beneath the rail, over which the trains ran freely.]

Whilst sitting under the huge Pyramid's shade, I tried to find the line of least resistance which the Egyptians would surely have taken when building that enormous work, and asked myself how it could best be built.

I started to climb it obliquely, like a slater climbing a roof, and came to the conclusion that the "Inclined Plane" would obviously be carried from one of the corners, probably the North-East, to about the middle of the South-East edge "arris-line," and then from a temporary levelled corner there incline upwards at the same angle across the South Slope to about the $\frac{3}{4}$th's level on the South-West "arris-line"—where a similar platform would facilitate oblique ascent

and the far more elaborate "*Screw of Archimedes*" used over 2,000 years ago, was long preceded by the simple winch.



M. B. Cotsworth's view of the EASILY INCLINED PLANE used by the PYRAMID BUILDERS to carry up the ordinary 2½ ton stones used, and roll up the larger 57 stones and apex.

The Builders thus taking the line of least resistance, along each slope and round the corner ridge to the next, could build the whole Pyramid without laying a single stone beyond those thus permanently built into their fixed positions, as diagonal wedges of wood cut diagonally to half the size of the stones along the incline completed their circumventing gangway. Rollers were used from the earliest times

MODEL sent me by J. A. Devenish, Esq., Engineer to the Government of India, showing the INCLINED PLANE as used for building in EGYPT, INDIA. etc.

Mr. Devenish and other European Engineers had to set aside their Western ideas and adopt this ancient Eastern method as the most economical for lifting large stones. They can thus readily lift stones 25 feet long, weighing 8 tons. The Great Pyramid stones averaging only 2½ tons each could easily have been transported thus.

along the West side (as shown upon the reproduction of my thus encased pyramid model), whilst possibly another zig-zag may have been needed to place the Apex in position.

By that simple means every layer of the stones could be successively completed from the levels respectively terminating each step of the Inclined Plane, and in addition the polished casing stones could be completed around the other sides most readily, whilst the most cherished and essential North Slope, upon the accuracy of which all their pyramid efforts depended, could be finished with ease and used for Shadow Observations even during the years of construction.

Lastly the builders had merely to fill in the outer portion of each layer of stones till then occupied by the Inclined Plane, as they descended step by step to finish at the corner where they began.

By that most simple means they gained an easy gradient (nowhere exceeding about 21°) up which their incline could be built without any waste labour, by merely chocking in wood blocks diagonally sliced down from the far upper to the near lower edge of each layer, so that the ordinary stones could be carried up quickly, as on Mr. Devenish's model, for (excluding the Apex and 56 large stones over the "King's Chamber" weighing about 54 tons each) the average weight of the pyramid stones was only 2½ tons, whereas Mr. Devenish's men and also native Engineers can readily carry blocks weighing about 8 tons by gangs of men.

The Egyptians could thus run up those inclines with 2½-ton stones far quicker and cheaper than any tedious rocking of such stones across wooden wedges could admit of,—besides the rocking would damage the under edges of the stones and spoil their finished fitting.

The "wooden implements" which apparently led to the "rocking theory," are referred to in Ancient Egyptian Pyramid records, which probably referred to the wooden half-block chocks, clamps, and lever poles, also possibly windlasses, as later described.

I found native Egyptian Builders in Old Cairo erecting square buildings by that easy gangway system, and was impressed with the fact that the Arabs carried their stone and mortar up that incline far more quickly than we could up our modern ladders and scaffolding. They almost seemed like children climbing up a toboggan height for the delight of coming down. They sang quite merrily whilst descending.

But when I noticed that easy gradient eased to turn round the corner of the building, along the 2nd side of which the incline was continued as the height of the stone-work increased, I felt still more satisfied that the advantages of that easy sloping plane, up which a number of men could carry such large stones as on Mr. Devenish's model, must have been obvious to the Pyramid Builders.

Unfortunately my photograph of it was stolen with many others of value in my photo-case, as already recorded.

I came across a native builder similarly erecting one of the pyramid-like pigeon-houses on a farm up the Nile Valley. He had not built high enough to need the turn of the incline round the corner, so I did not take a

photograph as I hoped to find plenty more, but unfortunately did not, as the labourers were being withdrawn from such work to attend to the land as the Inundation was ebbing fast.

It was, however, most interesting to find that simple Copt near the outer edge of cultivation, pursuing the methods employed by his ancestors 5-6,000 years ago. **He had neither need for scaffolding nor ladder,** but built the first course round up to breast height, except at the side up which he had left a crude sloping gangway from the ground-level at the Southern corner, to facilitate the carrying up of the stone required at higher levels, just as I opine the designers of the Pyramids did.

The imperative need for a broad "Inclined Plane" is manifest, as the great weights of about 54 tons in each of the 56 stones above the King's Chamber, together with the Apex and its setting stones, necessitated such a Sloping Gangway up which those huge stones could be rolled, as they were too heavy to lift. We know that they had rollers, and as that method was best adapted to raising heavy weights, and the incline so admirably fitted the shape of the pyramid, they must have used them.

Possibly they may have used fixed rollers of bronze, over which they trundled the heavy stones, hauled by winches placed at the corners, as shown by my model, since we know they were ingenious, and that the vastly more advanced winch-like "screw of Archimedes" was used long before the Christian Era.

Not only did the absolutely essential inclined plane method of raising heavy stones, together with the Equinoxial Slope, decide the shape of the Pyramid, but both the shape and inclined plane were a necessary consequence of the climate, as the toilers from September to March could then raise stones and work up the South and West inclines whilst they were in the shade during the mornings, after which they would wisely rest near mid-day, as Eastern people still do from the fierce glare and exhausting heat of the Sun. The stones were probably carried or rolled their first stage up the lower Incline along the East side when in the shade during the afternoons.

I would draw particular attention to the fact that this circumventing Inclined Plane was so economically adaptable to the needs of the Pyramid Builders, that not a single extra stone was required for its construction, indeed, it was so perfectly adapted to the varied thicknesses of the Pyramid layers (rendered necessary for economic use of the various sizes of stones as the masses were naturally quarried) that only the before-mentioned wooden half-blocks or a corresponding series of wedges, were required to fill up that edge of the successive Pyramid steps, over which skid-planks or beams were probably laid to roll or slide the heavier stones up the Incline.

At every point beyond those few temporary half-blocks and beams, **the foundation and material of those Inclined Planes was a necessary part of the Pyramid construction, nd the higher they went up that way the broader and surer was their base.**

The Egyptians could raise stones by that easy method, within a tenth of the time required by the tedious rocking process evolved by modern Engineers and University-trained men from those simple bosses, which I believe were merely used to keep in position a plain wooden chock to hold their lifting gear clear. That part of the clamp or calliper-like grippers they would then evidently use to avoid injuring the stones, as may still be seen by our " dog-slings," etc., used to grip the similar stones lifted by our cranes or carried up by groups of labourers as on Mr. Devenish's model. They would also be utilised to ease the weight, pull and push forward the larger stones up the thus necessarily broad Incline, because the ropes or chains could not be allowed under the heavy stones, or they would have impeded the use of the labour-saving rollers.

In view of that most easy, economical and effective means being so obviously the most suggestive, convenient, and best suited to the enormous requirements of those careful Pyramid Builders, who would certainly first think out that important part of their work most diligently and decide for the best, I cannot believe that they would use any other, so I must leave the authors and supporters of the " rocking theory " to their own devices, as the evidences already adduced compel me to believe in the circumventing Inclined Plane, shown upon my illustration.—Conviction derived from what I saw in Egypt would maintain me even if I had to stand alone in that belief.—That, however, is left for readers to decide.

By using the Inclined Plane the Pyramid Builders could most economically utilize any thickness of stone produced by the varying strata of their quarries, whilst still maintaining the important advantage of uniformly grading the polished slope and keeping the shadow-cutting arris-edges true from each corner of the base to the Apex, and withal upholding the great advantage of being able to utilise the same templets and mitrals for the slopes and corner stones throughout the whole of the 4 sides of the Pyramid.

The indisputable fact that the successive layers of the Great Pyramid as now existing, vary from 19 inches to 56 inches or more in thickness, tells heavily, in my opinion, against the rocking on wedges theory, as if the stones had been thus raised, an attempt would probably have been made to keep the layers more even, because that would have facilitated the rolling over of each stone as raised over the successive layers.

That rocking system would also be dangerous to the workers, as their loose wedges would tend to skid when such heavy stones were tilted on their edges whilst being rolled over to the next layer.

Again, the risk of breaking the edges, not only of each stone thus lifted, but also of the edges of the finished layers over which it would by that method have to be rolled, would, in my opinion, be far too great, even if we exclude that greatest risk of serious injury to the workmen, who would be exposed to imminent danger of falling that vast height of over 400 ft. in case of accident.

SUMMATION.

With the 100,000 men available according to Herodotus, their obviously cheapest, quickest and best way was to use the circumventing Incline, as I have shown, up which relays of men would easily, as per Mr. Devenish's model, carry the ordinary sized stones of the Pyramid into their exact positions on each layer.—Then the larger 56 stones used above the King's Chamber and for bedding the Apex, would be rolled upon bronze rollers (probably aided by winches and levers) up the same Incline, ready dressed to fit into their respective positions, till the Apex was fixed and the gangway or incline portions were filled up and fitted with casing stones, to complete that most massive work ever accomplished by united human efforts, for its most useful Almanac guiding and Time-serving purpose.

The regular labours of the Egyptians, then as now, were agricultural, but each year during three months, in August, September and October, the fertile land was so covered by the Nile's Inundation that agricultural work was impracticable, therefore it was much easier for the Egyptians to gather together large masses of the peasantry to then labour at building the Pyramids, as those men only required grain and water (like cattle in that salubrious and rainless climate where houses or even tents were unnecessary), whilst the sanitary conveniences furnished by the desert sand were far more perfect than in any of our modern cities.

In November, 1900, about mid-way between Cairo and Assouam, I saw several thousands of such peasantry repairing a canal breach which had washed out its lock and the railway embankment into the Nile.

The Nile water and numerous sacks of beans and dureh sufficed for them, as they rarely sleep with roofs over their heads at home. Simple surrounding walls suffice in the remote villages.

To such men the annual three months' work upon the Pyramids or other useful public work would appeal stronger than our public works for the unemployed. It brought the Agricultural labourers for three months into contact with large orderly communities as well as their fellows, and it would have the advantage of warding off the social dangers which enforced idleness always brings.

Therefore the Inundation probably was a potent factor then tending to urge the Egyptians into the fore-front of civilisation, where they were compelled to work out not only their own, but also the salvation of other nations by those stupendous efforts at Pyramid Building, to solve the Yearly Seasons and food supply for their teeming populations penned up in their narrow fertile strips of desert-bound land.

We have seen that as the early Egyptians grew in numbers, they had to provide a system of Time and increasing crops for food as their race became more numerous, and were confined in the narrow desert-bound land strips within the Nile Valley. They thus became cooped up so uncomfortably that the growing danger of Famine and starvation became accentuated as years passed.

THE EGYPTIANS WISELY PROVIDED WORK FOR THEIR UNEMPLOYED.

Ultimately they were inexorably compelled to exert their greatest efforts by building the Pyramids to attain better knowledge of sowing, etc., times, by applying which more food was grown to maintain their lives and that of the Nation.

Their very existence was at stake, and as the great Almanac or Year finding problem first became most acute in Egypt, under the wonderfully productive conditions which there so rapidly accumulate human life (as instanced in the 1st chapter of Exodus), they had to solve that most difficult problem for humanity, just as the United States will have to solve the great problem of freedom and justice to labour, whether the American people like it or not.

There the growing strain between capital and labour is surely becoming more acute than elsewhere in the world, owing to the peculiar accumulating conditions there developing, and as the clash of interests is there being forced more rapidly by the Trust Builders over-riding and engineering law and prevaricating justice, our American friends will inevitably have to bear the brunt of the great struggle now coming as a necessary part in the evolution and emancipation of humanity, who, in future generations, will be thankful to the United States for the great and painful travail with which that coming freedom must be born to all people who will benefit by the great American struggle, just as humanity has ever since gained by the mighty Almanac labours of the Egyptians, who, by their Pyramid efforts, gave birth to our Calendar System of Time.

We still find that "system" in arrangements based upon exact Time, is the golden key for success to both nations and individuals; indeed, the measure of systematic development attained is the measuring standard of civilization and differentiates us from uncultured Races.—"System" rules and must prevail.

Just as the prosperity of the Israelites dated from Jacob's systematic application of the evenly-fitting "6-months year," and they became a great people under Moses, who applied the more useful 12-months year for them; so the Romans became more prosperous from the time Numa (about 713 B.C.) gave them the crude 12-months year, and they developed into a great nation when Julius Cæsar gave them the truer Solar Year and assured systematic Time.

Similarly we can trace the prosperity of the Chinese, Babylonians, Egyptians, etc., to their Astronomic researches towards locating the Seasons, by which they gained truer "systems of Time" to further their needed developments in Agriculture, etc.

Had Mohammed, the great founder of the Mohammedan Religion about 600 A.D., been sufficiently wise and powerful to enforce the adoption of the true Solar Year and disregarded the confusing lunar year of 12 moons, his followers would almost inevitably have developed a far higher and more progressive civilization.

So far as personal study of the Mohammedan Races enabled me to find the tap-roots which hold them back from progress, the strongest appears to be their enervating climate, and the next the use of the imperfect and misleading lunar year, which has a far more retrograde tendency upon the character of the people than most persons imagine, as even now with the Mohammedan printed calendars it still develops amongst the masses of the common people (upon which national prosperity depends) that careless indifference to precise times and system which are absolutely necessary to secure efficiency and progress.

The recurring Famines in the Earliest times gradually compelled men to roughly observe the Seasons, but as population increased in the fertile valleys of the Euphrates and Nile, where crops were grown with the minimum of labour, the Babylonians and Egyptians were by necessity compelled to develop higher culture of their lands to meet their growing needs for food, as they had to maintain increasing populations and armies to prevent the incursions of neighbouring peoples, whose growing numbers led them to view those choicest lands of the then known World with envious eyes.

The early Priests and Rulers had to meet the crying needs of their people who in early centuries had been repeatedly decimated by Famines.

Experience proved that food crops could only be relied upon when the sowings were accurately timed to the right Seasons, any variations from which curtailed the food supply; therefore as population increased it became more imperative that true Almanac Times should be established—in fact the very existence of the nation was seen to depend upon being able to precisely locate the Seasons, to gain the fullest aid from the growing forces of natural production directed by wisely-applied industry in due Seasons.

The Priestly Observers saw that to solve their momentous difficulty, they could best find out the crucial length of the Year by studying the Yearly movements of the Sun as the reflected motions of its shadows were then best displayed by Pyramids, which afforded the only possible means of building gnomons high enough to sufficiently differentiate the Yearly shadows,—hence in their great National emergency they unitedly and resolutely decided to build their mighty Pyramids, for that supreme object of maintaining the lives of the people by acquiring and applying the best Almanac knowledge.

To that stupendous work they applied their best energies with a determined will, which far exceeds anything else which has been accomplished either before or since.—Indeed we may fairly say that the Pyramid Builders put forth the heaviest and most supreme efforts of humanity to adequately solve, as they thereby did, the greatest task and most difficult problem which human ingenuity and effort had inevitably to face.

From the foregoing, we may conclude that the Egyptians held that knowledge of the true length of the year was of the highest possible importance to their well-being, and that their marvellously protracted and laborious pyramid efforts were not intended for Tombs. The sepulchral idea is manifestly utterly inadequate to have ever induced men, under any conceivable conditions, to undertake and waste such stupendous labours upon any monarch. Such a preposterous theory must be abandoned.

On the other hand, it is submitted that the pyramids were designed and erected to find those natural sub-divisions of TIME, in all its phases of Hours, Days, Weeks, Months and Years, which have such ever-present and far-reaching effect upon the happiness and prosperity of all mankind.

TIME, centred in the length of the Solar Year, is incomparably the greatest and most practical factor of human knowledge, altogether surpassing in importance the discoveries of later centuries, as it permeates practically all our arrangements. Of necessity, we have fixed times for working-hours, meals, appointments, trains, ships, municipal and governmental affairs, international postal interchanges, etc. In fact, all our industrial, social, etc., movements hinge upon "TIME," the most vital point of which is undoubtedly the known length of the Year, and our daily gradations through it, as rendered so familiar to us by the Almanac.

By the Calendar we know when to prepare the land, plant, sow; and for how long food has to be provided until the harvest, etc., Seasons return. That knowledge enables us to decide the quantities of seed to be sown, and area of cultivated land required to save us from the miseries of Famine with consequent emaciation, disease, and premature death, which inevitably afflicted the earlier populous races of men, until the length of the Year was known.

That prime factor took men thousands of years to find out, as proved by the fact that it was not known in Europe even as the 365¼-day period until about 370 B.C., prior to which years of 365, 360 and 354 days were used. Before then, shorter periods would be used the further we go back, until the lunation (or month) of 29½ days practically began men's long-time count.

In still earlier times, before men learned to count so far as thirty, we may reasonably assume that shorter periods of ten and even five days would serve; whilst before that, simple day counting would soon pass men's mental grasp in the most primitive state, when

our ancestors were quite as oblivious to the passing *Time* as the Australian Aborigines were found to be when first discovered. They seemed to have no idea of Time, their mental grasp being almost limited to yesterday, to-day, and to-morrow.

From such primeval state men had originally to develop their ideas of Time by exceedingly slow stages of expansion through generations, when restricted surroundings and inherited habits of thought retarded mental development, until the growth of population forced necessity, the mother of invention, to originate almanacs to secure more food by rightly sowing. Then, long-time periods would be forced upon the notice of men, who could not longer thrive as their fathers had done, almost without labour.

All historical research proves that men had to seek out the laws of Nature by observation, and that their ideas of Time developed very slowly, owing to the natural conservatism with which children cling to and revere the old-time methods of their parents.

From the "Bible Ages" portion of this book, it seems fairly evident that the monthly unit or lunation formed the basis of Time records until the time of Noah, when longer time units began; but direct evidence is not forthcoming to prove the Year unit upon which the earliest Egyptians worked until they began to build pyramids. Certain it is that they did not know the length of the Year during many centuries. *Very many generations would pass before the idea of any longer period than a lunation would be suggested*, almost until the increasing population necessitated and provided for the systematic building of the pyramids, which enabled the rulers to trace the Sun's Seasonal elevations. The leap from month to Year was a very great step for their stage of civilization to reach, when all their astronomical notions were so vague and extremely difficult to verify, for, although this appears so easy to us, we must remember that they had only very scant information, and but slight experience to guide their reasoning. We know the laws of gravitation, Kepler's Laws, etc., as the result of men's highly developed thoughts transmitted and extending over thousands of years, but prior to the pyramid times they only began to learn about lines, triangles, and angles of elevation by which they might roughly measure the year.

Errors in their estimate of the Year would cause the difference to accumulate and lead to those early or late sowings, which brought Famine and ruin to the nation. This danger would compel the rulers and "wise-men" to seek out a reliable measure of the Year, to guard the people against the miseries and anxieties they had formerly undergone. When we reflect that a fully understood method of regulating Time in its comprehensive limits is the first essential of good government towards ensuring Crops upon which the existence of a nation depends, we may form a faint idea of the absolute necessity to the

Egyptians of uniform Time knowledge for the wise government of their dense population, with their numerous slaves engaged in organized labour and national defence.

We should remember that the envious eyes of the Babylonians, Assyrians, Ethiopians, etc., were ever seeking to seize upon Egypt because of its unparalleled fruitfulness and delightful climate, therefore the Egyptians were compelled to maintain a large army for defence and develop greater crops by higher cultivation to keep alive the rapidly growing population.

After this lapse of time, the totally changed conditions of life only very dimly enable us to estimate the very real value which the rulers would attach to knowing the length of the Year. We can only measure it by the fact that, in their efforts to solve the greatest problem to maintain their lives, they apparently centred the whole energies and life of the nation round the building of the pyramids, to find the solution during the earlier Dynasties when Egypt thereby raised itself to the first place among nations.

When once the earliest Calendar was formed for the Year, they thereby acquired such an advantage over their neighbours that their prosperity was rapidly increased. We may judge of the value individuals placed upon the Calendar by their recording it over the doorways of their Tombs, and the zealous secrecy with which the knowledge of the Calendar was kept to the privileged classes until a few centuries ago. The importance attached to the New Year by the Egyptians and all succeeding nations has emphasized that value during all subsequent time.

Apparently the Chaldeans, etc., within the Euphrates Valley first realised from hunger the growing necessity for truer Seasonal knowledge, and made the earliest Pyramid efforts to locate the Seasons by building the terraced "Tower of Babel" as the Bible records.

Probably the next Pyramid attempted was the most Southerly one in Egypt, at Medum, which was similarly terraced, as scaffolding and inclined planes do not appear to have been invented till much later. Thus it appears that whilst the idea of the terraced Pyramid may have been spontaneously evolved in Egyptian minds by observing the shadows of the Older Sphinx as I submitted under that head, it seems quite likely that pyramids may have been suggested by travellers to or from Arabia, as communication existed across the narrow Red Sea during very early periods.

The gradual evolution of the Pyramid System is traced out through several stages in the description given of the Pyramid of Medum, where the early Egyptian pyramid experiments were evidently carried out and the basis of the Pyramid System of Astronomy laid, as from that time we find successive pyramids were built by the Egyptians, whose

next attempt appears to have been the celebrated "Step-Pyramid of Sakkarah," as per pages 200 and 371.

That huge effort to locate the 6 months' rise and 6 months' fall of the Sun's Seasons proved inadequate to define the Seasons with sufficient accuracy, and apparently led to the more perfect pyramid style of uniform slope as later evolved through the over thirty pyramids which were successively built until they culminated in the Great Pyramid at Gizeh.

The most difficult problem humanity has ever faced was ultimately solved by the mightily sustained efforts of the Egyptians, who through thousands of years heroically reasoned geometrically and laboured enthusiastically to build their pyramids true to the Equinoxial Slope, which was only indicated at one precise moment once in 128 years, when the Sun crossed the pyramid's meridian precisely at Noon on the Vernal Equinoxial Day.

As the Sun appeared constantly moving, and only indicated that critical Astronomic Angle cutting the plane of the Ecliptic at that exact instant of time in each 128 years' period, they struggled continuously to find it by studying the Equinoxial Shadows cast from their pyramids, which were thus successively erected to the truer Equinoxial Slope, as successive generations strove to improve upon the knowledge transmitted by their ancestors.

But as 3 or 4 generations lived in the intervening 128 years' period, when records were rare and exclusively secreted, whilst each Year the Sun showed very nearly the same Equinoxial Elevation, they were compelled to raise higher pyramids to cast longer Equinoxial Noon-Shadows, to thereby enlarge those mysterious differences shown by comparing the lengths of the Shortest Shadow cast at each Spring Equinox, because the complex fraction, beyond 365 days in each year, caused the Sun to indicate Noon on the Pyramid's Meridian nearly a quarter of a day before the full yearly elevation was attained, hence, as the Sun thus appeared nearly quarter of a day's range below the Pyramid's Apex it cast a Meridian-Shadow on the floor-line about 1 foot longer than on the same Noon in the preceding year, until 366 days intervened in Leap-Year, as shown on page 28.

The Pyramids, as huge shadow-reflecting observatories, had thus inevitably to be raised to the greatest height possible, to enlarge those crucial shortest Equinoxial Shadows, so that the observers could thereby find the true length and precise Seasons of the Year, just as we now use telescopes and microscopes to magnify objects from which we desire to learn more completely their methods of working and the Creator's wonderful designs therein displayed, so that we may usefully apply the wisdom thereby gained for the fuller benefit of our own and future generations.

From the instances given, and many more which might be quoted, we have seen how the acquisition and application of truer Almanac Knowledge enabled the respective Ancient nations to enhance their prosperity.

ALMANAC KNOWLEDGE AIDED NATIONAL PROGRESS.

The Ancient Assyrian and Chaldean, as well as the Egyptian advancement, may be traced from their success in applying better Almanac Knowledge of the Seasonal Agricultural Operations than their contemporaries, to their increasing varieties of crops rendered necessary as population increased.

The descendants of Jacob increased in numbers, wealth and power as they profited by his staked "Amplitude" observance of the Seasons, but the Israelites gained still more advantages from the truer Almanac which Moses conferred upon them after he had obtained that secretly cherished knowledge from the Egyptian Priests, by whom he had been taught as an Egyptian Prince.

Similarly the Greeks acquired their improved Almanac Knowledge from the Egyptians by trading and intercourse through Alexandria. From that time they prospered, because they thereby secured more abundant food with much less labour and risk of famines, etc., consequently they soon gained more leisure for advancement in the Sciences, Arts, culture of Social Graces, etc.

By like means the Romans appear to have derived their Calendar Times and records of the Year from Greece and Egypt, and from that time they rose to become the mightiest National Power on Earth.

Almost throughout those and other pre-Christian National developments, the Egyptian custom was followed, limiting the acquisition of that knowledge and power to declare Seasonal Festivals, within the privileged Priestly Ruling Class—partly because they were the learned people of their time, but mainly to keep the national advantage of the Almanac Periods, etc., secret from other nations, who might become more powerful if they secured its advantages.

That was then a far more potent National factor than the secretly-guarded designs of modern artillery guns, rifles, or sub-marines are to-day, as it conferred not the powers of destruction but of construction, by that secret which assured increase of strength and numbers to their Nations thus equipped.

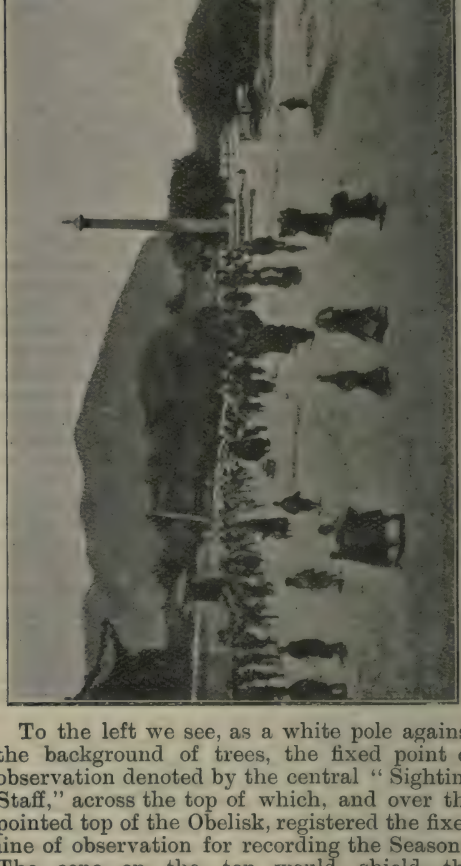
We need not go further back than the 16th Century to find how closely guarded were national trade secrets, when even the Cultured Venetians repeatedly tracked out and assassinated artisans who went out to other countries with their secrets, as evidenced by the history of Glass, etc., manufactures.

On page 78d, 184, etc., are detailed part of the remarkable evidences thus far traced to prove that the Pyramid method of recording the Time of the Seasons, etc., by Shadows, was continued in various forms until they were displaced during the 18th and 19th centuries by printed Almanacs and cheap clocks and watches. Therefore I need only here record the following further evidences :—

The last page of the pink section, by the reproduction of the January page of the 1712 Almanac, demonstrates the fact that "Travellers' Staffs" were used in England until then, to find the Times of the Day and Seasons of the Year, just as the Arabs of the Desert still do by their own shadows as recorded on page 186.

It is also interesting to observe that the Thibetans erected their Obelisk at the foot of the Lhassa Vatican in the like 30° latitude as the pyramids of Egypt, and had the ingenuity to top their Obelisk with a broad-based cone to cast a bolder pointed shadow, and also to shield the eye of the observer when the Sun appeared behind that cone at the regular and precise times of Observation.

It is very remarkable that one of the first photographs received from the recent Expedition to Thibet shows, as reproduced below, that very simple Obelisk method of Observation perpetuated in Lhassa to the present time by the ruling conservative monks.



From the "Sphere" of October 22nd, 1904, by kind permission

The OBELISK at the foot of the LHASSA VATICAN, in THIBET, ASIA.

To the left we see, as a white pole against the background of trees, the fixed point of observation denoted by the central "Sighting Staff," across the top of which, and over the pointed top of the Obelisk, registered the fixed line of observation for recording the Seasons. The cone on the top would shield the observer's eye from Sun glare, whilst the shadow of the high Obelisk would record daily hours.

Mr. R. N. Hall, writing in the "Sphere," page 238, for June 13th, 1903, states that, during January, 1903, whilst excavating in those marvellous ruins of Zimbabwe in Rhodesia, (which constitute the grandest group of ancient structures not only in South Africa but in the

Southern Hemisphere,) he there found a "Solar "Disc (made from Soapstone) carved with a "circle surrounded by 8 smaller circles or "knobs, similar to the markings on one of the "ornate objects previously found at Zimbabwe "and pronounced by Mr. Bent to be a Sun-"image."

That late esteemed explorer, "Mr. Theodore "Bent, made the preliminary survey of the more "conspicuous remains described in his classical "work *The Ruined Cities of Mashonaland*, "pointing with Mauch to the Semitic peoples as "the exploiters of those rich Goldfields."

"The chief interest of Zimbabwe centres round "the Great Conic Tower, the Western Acropolis, "the 'Valley of Ruins,' and the Eastern Elliptical "Temple, where Mr. R. N. Hall found the "remarkable granite cement Cone and Obser-"vatory Cylinder *in situ*."

From the "Sphere" for June 13th, 1903 by kind permission.

The WESTERN ACROPOLIS at ZIMBABWE (in Rhodesia, South Africa).

Note the similarity between this Observatory and that of Lhassa opposite, also the lower platform built for the Sighting Obelisk or Monolith from which the Seasonal position of the Sun could be sighted across the 3 Monoliths erected on the purposely higher erection to the right, about the half quadrant angle, to mark the Equinoxes and Solstices.

The stone terracing above the huge boulder is similarly found in Southern Arabia.

I cannot believe that these were merely erected as defensive works. They appear far more like Observatories, as their Orientations and Sun Observation lines indicate.

Respecting these I hope to say more when the Orientations, etc., are cleared up in my next edition. At present space can only be spared for briefly indicating Zimbabwe's evidence of "Changing Latitude," and its use of Monoliths as Vertical Sighting Stones.

Professor Keane, in his book *The Gold of Ophir*, indicates that "the Arabian Sabæans "who controlled this source of the gold market "of the Ancient World for 2-3,000 years B.C., "were the purveyors of those vast treasures "poured into the coffers of David and Solomon "through their Phœnician friend Hiram, King "of Tyre, from these Gold Mines of Ophir."

I have on page 22 referred to the fact that when the great Astronomer Eratosthenes made the first measure of the Earth at Ancient Syene (now Assouan), his vertical "Sun-well" there cut beneath the Tropic of Cancer is now in Latitude 24° or ½° North of the 23½° Tropic; it is, therefore, most interesting to find that Zimbabwe, the Ancient great Southern Observatory, is now 3° North of the Tropic of Capricorn, an increase possibly due to its 2,000 years' greater age, as it seems to me almost certain that this great Zimbabwe Observatory, with its wonderful Conic Tower (similar to the Peruvian Cones—also of the Southern Hemisphere) and huge Eastern and Western Orientated Temples, formerly marked the position of the Tropic of Capricorn, as the Ancient Observers there studied the to them interesting and momentous question of the Sun's return at the recurring Solstices to renew the Yearly Seasons.

It may even be possible that as they worshipped the Sun whose colour was gold, they may have conceived the idea that he yearly came to hover over the golden treasures hidden there.

Here I may note in passing that this North Latitudinal change in the Eastern Hemisphere would in a given direction of the polar progression result in a corresponding South Latitudinal change in the Western Hemisphere, hence it may be that the Ancient Mexican Observatories or Pyramids which are now about 4½° South of the Tropic of Cancer, may have marked sacred sites formerly under that Tropic, as the direction of polar progression after the American Glacial Period appears from Geological evidences to have been Northerly off the East Coast of Greenland, and its speed far greater than now.—Therefore, as Mexico would thus be so near the then central Meridian of change, the "Change of Latitude" at the Mexican Pyramids would be much more marked during the last few thousand years, than at the Egyptian Pyramids which were so much nearer the "hub" of the Earth-turning movement, hence the difference between the Pyramid's original fixed slope and the present changed angle of the Cairo mid-day Sun at the Equinox, would during the same period register a smaller "Change of Latitude" than in Mexico.

The subject of Changing Latitude is, however, so extremely complicated and difficult, that it cannot here be pursued beyond its bearing upon the shifting difficulties which beset early Races during their efforts to locate the Seasons for useful Almanac purposes.

It is, however, specially interesting to be able to see by the photograph shown, how the great South African Races in Ancient times used the most naturally suggestive means of Monoliths or Vertical Stones, as Obelisks to locate the Seasonal positions of the Sun, and that they so carefully built large works of stone to erect thereon Obelisks at sufficient elevations to there register the high Altitude of the Sun at the Tropic.

There the small angular variations of the overhead Sun were daily too small to precisely locate the Seasons by shadows, as the people there could neither erect Pyramids nor Obelisks sufficiently high, nor yet could they dig Sun-wells deep enough to adequately differentiate the shadows to denote the Seasons of the Year, therefore necessity led them to resort to *the half quadrant angle*, as it registered the most easily observable point mid-way between the Horizon and the Zenith, and was the most suggestive and best available means of there recording the Solar position at that *fixed* Astronomical Angle of 45°, which *at the Equinoxes* registered the Celestial Equator by the central Obelisk's top at the precise times of 9·0 a.m. in the East and 3·0 p.m. in the West.

The Obelisk to the North of the central one seems to mark the Celestial Tropic of Cancer as registering the corresponding times at their Winter (our Summer) Solstice.

Similarly the Obelisk to the South of the high central one appears to mark the Celestial Tropic of Capricorn, to register their Summer (our Winter) Solstice at the exact times for observation, indicated when the centre of the Sun appeared disced upon the apex of the Obelisk.

They could not register the Sun overhead and apparently had not thought of the Eratosthenese method of sinking a "Sun-well," so they evidently conceived the idea of tracing the Sun's Seasonal course between North and South at the Equinoxes, by the almost Vertical Obelisk on the higher erection, alongside which the two Sloping Obelisks may have registered the Tropical lines when observed regularly at a convenient hour, fixed by the registering line permanently marked across the lower Obelisk (appearing as a white pole against the lower bush to the left) purposely fixed upon the lower platform, so that the observer standing there could "sight the Seasonal Points" from that fixed centre across the tops of the raised Obelisks.

Those essential erections in their Observatory thus enabled the ancient observers at Zimbabwe to fix their Almanac Times and the Length of the Year for the use of their people.

The present slight deviation from the original 45° angle is partly due to the fact of the falling positions of the "Sighting" and outer Obelisks, and partly to the "Change of Latitude" which lack of space precludes me from detailing further than already shown.

That may be understood by studying the Maps and evidences I have quoted from Professor Wright's *Ice-age in North America*, *Man and the Glacial Period*, Dr. Nansen's *Farthest North*, and my investigations which led me to believe that the North Pole had progressed approximately along the —·—·— line I have added to Professor Wright's Map on page 214.

Consideration of the effect of that Change of Polar Progression upon the Globe will prove to reasoning minds, that not only would the Change of Latitude vary in speed at the same time in different parts of the Earth, but also that differences would result when comparing that "Change of Latitude" by fixed Observatory records founded at widely different dates, as the position of the Pole at the time of each foundation would register variations which would be further altered by their own altering positions in relation to the tortuous line of Current-driven polar progression, which very gradually changed the Meridians over the respective Observatories, hence the movement was not calculable as it did not follow the direction of any mathematical cycle or spiral in regular sequence.

By bearing that deflection in mind, what might seem to be inconsistencies between the registers upon present Meridians (*e.g.*, The Great Pyramid and Zimbabwe) may be removed, as the tortuous course of polar progression makes it quite possible for an increase of Latitude on one Meridian in the Northern Hemisphere to be consistent with a decreased Latitude on the same Meridian in the Southern Hemisphere, because the overhead Meridians have been skewed during the passing of "polar progression" across the present direction of the Meridians mapped over the Earth's surface.

That leads us to expect to find slight deflections of Orientations at Ancient Observatories, beyond those caused by the Precession of the Equinoxes.

Therefore we may conclude that there is no periodic cycle to enable us to solve their precise Astronomical Ages in the past, as even the apparent register by the "Precession of the Equinoxes" is deflected by the incalculable factors of "Changing Latitude" and "Deflected Meridians" as the Polar location tortuously progressed.

That is why I submit that we need never hope to do more than establish the fact of "Changing Latitude and Polar Progression," approximate its direction, and form an idea of its very slow speed from geological, historical and physical evidences.

Further evidences of the evolution of Ancient Almanac Methods have been disclosed by new light from two remarkable stones lately unearthed by the German explorers on the site of the old Ionic Port of Miletus, on the South-West Coast of Asia Minor. Those stones are the remains of Calendars, of which one is shown to date from 109 A.D.

The Ionic year was then divided into 12 Zodiacal signs, and against each month the motion of the remaining signs was given, with a note predicting the weather.

On the left side were 30 holes through which a wooden peg was moved forward one hole each day, thus recording the monthly dates.—The central fixed peg would also serve as a vertical style to the Sun-dial for daily time.

This new find has made clear the meaning of "*parapegma*," or Peg Calendar, a name by which other stones have been rather mysteriously known; but when we consider those ready means of public Almanac record in the light of the less exact and more restrictive knowledge of 1,800 years ago when printing and other diffusing means were unknown, we may realise that such simple Stone Calendars under the direction of the High Priests and Rulers, were admirably suited to the more simple and less exacting requirements of that early period of the Christian Era.

It is quite likely that such Peg Calendars were not only used to peg round the 365 days during the months to register the years, but also to record the 365 successive moons, which formed the longest Festival Period, or "Year of Moons," to celebrate which, as a 30 years' Jubilee, the Oldest known Obelisk was erected by Usertesen, as per page 145.

That 30 years' period thus easily recorded anywhere, may have been originally derived from the 32 years' recurring period recorded by the shortest Pyramid shadows, as per page 78, but as that could only be maintained where Pyramids were built, the inhabitants of some less-favoured countries had to adopt the more easily understood cycle of 365 moons recorded by the *Parapegma*.

In tracing back the historic development of the Calendar basis of our Almanacs, it is interesting to find that amongst the charred remains of the Fire at Westminster Library in 1731 was the old Saxon Codex *Vitellius* E XVIII. Its mutilated pages now preserved in paper prove that Calendar to be written in Normanno-Saxon letters.

Dr. Hickes supposes it was written about the year 1031, and describes it as recording the months in Saxon and Egyptian.—("Kalendars of the Middle Ages," by R. T. Hampson. Kent, Causton & Son, London.)

The Egyptian characters, with other evidences such as the "Nile" ∧∧∧∧ "water" sign for Aquarius in the Zodiac, tend to show that the Calendar originated with the Egyptians.

Further confirmatory evidences of the dominant attention given by Ancient Races to the acquisition of regular Almanac knowledge are now being discovered in Babylonia, Crete, Greece and other ancient countries. These must, however, be deferred until a later edition.

Beyond the Pyramids and recorded Obelisks in Egypt we have those interesting sculptured Zodiacs at Denderah, Karnac, Thebes, etc., as well as the Tablatures at Abydos, etc.

In America we find similar Pyramids with the Great Mexican Calendar Stone, Peruvian Cones, Mississippi Valley Mounds, whilst corresponding erections range across Asia, and the Obelisk methods still prevail in Thibet and Rhodesia (S.A.), as evidences of the universal need of Almanac and Time knowledge.

We thus know that ancient peoples toiled through thousands of years to develop their Calendars, as the records of History and ancient monuments teem with evidences of their Almanac research, and the importance they rightly attached to the discovery and records of the seasons and true length of the Year.

Therefore we need not wonder that the Arabians and Romans continued as secondary Races so long as they continued to use their un-seasonable 10 months' year, then so conveniently counted on the hands. But from the time they rationally applied the 12 months of the Solar Year, they rapidly developed in numbers, influence and power.

The early Romans, under Romulus, had only a 10 months' year of 304 days, to which Numa added January and February about 713 B.C. The 12 months were then limited to alternate 29 and 30 days, to accord with the revolutions of the Moon, because the scattered peoples could only use their Moon records for days, weeks and months. So they had a year of 354 days, then 11¼ days short of its true length.

That, in three years, led to their season recorded times for sowing, etc., getting wrong over a month, and more over longer periods, consequently failure of crops and famine resulted.

As the Roman Rulers perceived the advantages of using even that crude 12 months' year, and heard that there was always "Corn in Egypt," where the truer year of about 365 days was used, various adjustments were tried, and Numa ordered a 13th month of alternately 22 and 23 days to be added every alternate year between February 23rd and 24th. —That gave an average of 366½ days during each 8 years.

Later it was ordered that every 3rd period of 8 years should only have 3 of these extra months of 22 days each, to reduce the average to 365½ days.

But obviously that was a clumsy and inconvenient method, causing much confusion and considerable loss to the people then mostly engaged in agriculture, because each successive year was nearly a month shorter or longer than the preceding or coming year, except during the 3rd year of each 8 years' cycle, and wrong sowing times entailing loss to crops naturally resulted amongst the illiterate farmers, whilst the Rulers of Provinces, etc., earned different payments during their different periods of office.

The length of that extra 13th month to adjust the Civil to the Solar Year was subsequently left discretionary with the Pontiffs, who continuously arranged and directed the Calendar

in secret—but the public driving of the Yearly Nail into the Pillar of the Temple of Minerva (the Goddess of Wisdom) by the ruling Cæsar, was long perpetuated to mark the first noon-day of each New Year.

The Greeks had interpolated an intercalary month of 29 or 30 days (to keep within Moon counted months) every other year, which averaged 7½ days too long each year till rectified by later omissions.

As many of the less-advanced peoples of Europe used still cruder year measures, the confusion and loss arising from lack of true Almanac information must have been great.

Eventually the Power of Greece forced admission into Egypt by conquest about the year 340 B.C., when they gained the supreme advantage of the Egyptian Calendar for guidance in governing the Empire.

As the Roman Empire extended over Europe, the difficulties caused by conflicting Seasonal Periods of count for Legal, Taxation, Festival, Business, etc., purposes, became more evident as population increased under the settled peace secured by Roman Rule.

In Rome, where their Government was focussed, the knowledge of the Calendar and the dates of the Feasts, etc., were for a long period **kept secret,** but about 304 B.C., Flavius a scribe, surreptitiously obtained the key plan of the Calendar and engraved it upon a pillar outside Rome, whence its information was copied and disseminated widely before the authorities became aware that their cherished secret had leaked out.

The Populace had become all the keener and refrained from letting the Pontiffs know, because the Pontifical Power of variation had been abused for political purposes, as by giving more or less days to the intercalary month, the terms of magisterial and other offices (with their valuable perquisites) were altered by the Priests, as the Ruling Parties gained influence over them, to bring the annual elections to opportune times to suit the Party in Power.

That went on until Julius Cæsar's time, when the difference between the Civil and Solar Year had accumulated to nearly 3 months, so that Winter appeared in the Almanac's Autumn, Autumn in Summer, etc., the Almanac being then altogether out of gear with the Seasons.

Julius Cæsar rose to the occasion, and instituted a fixed year of 366 days, by simply counting the **odd** months, January, March, etc., 31 days each and the **even** months 30 days. His successor, Augustus, being born in August, was too proud to let his month be one day shorter than Julius Cæsar's, so he took one day from February and added it to August.

The Bankers and Landlords of that day had power, and objected to the interest for the 3rd Quarter of the Year extending to 93 days when the 1st Quarter only had 90 days, and, probably, prisoners sentenced to those three months objected to the three days extra, so one day each was deducted from September and November to make the 31st days of October and December.

Hence we may see clearly that our erratic months were partly fixed by the caprice of the Roman Emperors.

Julius Cæsar had adjusted the Almanac to the Spring Equinox by lengthening the "Year of confusion," 46 B.C., to 445 days, after which the years were recorded regularly.

It is significant that he obtained the valuable guidance of a great Alexandrian (Egyptian) Astronomer, who advised the insertion upon the Calendar of Leap-day every 4th year between the 24th and 25th March, to record the Spring Equinox truer.

It is remarkable that his Alexandrian adviser appears to have overlooked the small difference between the 365·25 day year and the true 365·242 year, which during 128 years amounts to one day in excess, as shown by the Pyramid's Shadows (vide page 79) as the Equinoxial angle of the Sun at Noon every 128th year shines sheer down the Slope of the Pyramid, so that no Shadow falls within the day gauge, the previous one having fallen on the line bounding the day-gauge.

That small error was not rectified until Pope Gregory XIIIth's Reform in 1582 suppressed the ten days (the other two days had been adjusted by mistaken Leap-day additions after Julius Cæsar's death) because the Equinox had retrograded to the 11th of March. To prevent that in future, Pope Gregory provided that Leap-days should be omitted in centenary years, except those which are multiples of 400, and 4,000, so that the Equinoxial "Key of the Year" cannot vary a day in 20,000 years. We must, therefore, hold to that total length of Year and Leap-day adjustment.

When Constantine, the first Great Christian Emperor, established Christianity as the State Religion of the Roman Empire, the Pontificate became Christian, and as they still kept the power to regulate the Calendar and Festivals of the Year, Christmas was kept near the Winter Solstice, and Easter about the Spring Equinox, to attract the people from their old seasonal Festivals of Yuletide and Spring.

As the earlier Christians of Alexandria, etc., had started to keep records approximately from the Birth of Christ, and had counted their Golden Numbers (as the first factor of the Calendar co-ordinating the Sun and Moon Cycles by the 19 years of the Metonic Cycle) so far establishing a fixed Era, that was adopted by the Council of Nice in the year 325 A.D., when it was so unfortunately decided to continue the absurd and confusing Moon-wandering dates for Easter—presumably because it best served the interests of the Priesthood, who could thereby secure the attendance of the people bringing their tithes to church, as there only could the people get to know the dates of the Festivals, Times for Ploughing, Sowing and other Agricultural operations, which were declared by the Priests from the then mysterious hieroglyphics of the "Clog Almanacs" which were hung up beside the altars—just as the Clergy still continue to declare the Festivals, Saints' Days and other public notices from the pulpit each Sunday.

In that way the Almanacs were kept almost exclusively under clerical control during the "Middle Ages."

Privileged persons in the nobility and governing classes occasionally secured "Clog Almanacs," but the first printed Almanacs in Europe appeared in 1457, and reached England in the year 1497.

Then professional Almanac constructors began to impose upon the public. Eventually, in Queen Elizabeth's reign, the monopoly to sell Almanacs in England was granted to two members of the Stationers' Company, whose families maintained that privilege until 1828, when Almanacs became cheaper and more extensively used.

Since then the issue of Almanacs has been more profuse as years have advanced, but all have been constructed on the old plan of 12 erratic months, quite oblivious of the inconveniences arising therefrom, and regardless of the growing requirements of modern life and commercial methods, which are now so vastly different from those of nearly 2,000 years ago, when the irregular 12 monthly divisions of the year were arbitrarily fixed by the Roman Cæsars.

Those Rulers did not hesitate to alter the Calendar by three months or more when they knew that it was for the welfare of their people—and we may be sure that if Julius Cæsar could now see the anomalies, waste labour, and multitude of needless references and annoyances now caused by our imperfect old-fashioned Almanacs, he would upbraid us for failing to do our duty towards perfecting our Almanacs to better meet the requirements of our generation, when historical and monumental records so conspicuously demonstrate the vast labours and persistent efforts put forth by our early Ancestors, to gain that true Almanac knowledge which we are too prone to regard so lightly now.

The vast benefits of a reliable Calendar were so fully appreciated by the early generations of the Christian Era that their Almanacs, as ordained by the Popes and Papacy of Rome, became regarded as perfect and infallible, whilst the needless changing names of the days through the corresponding dates of successive years, the present senseless and confusing Moon-wanderings of Easter and its contingent Festivals, together with the wasteful, erratic and inequitable months of uneven length, were submitted to, because they knew of nothing better.—Indeed, when probably 999 out of 1,000 average persons scattered over Europe had of necessity to be guided in their Time records by the Moon's phases, checked by the Priestly declarations of Festival dates from the Altars of the Monasteries, etc., there was something to be said in favour of the Moon-date variations of Easter, especially when it also appealed to that sense of mystery which led to religious considerations and the idea that it was ordained of God because the Jews had used it.

But from the following explanation of the Jewish Calendar, it seems quite useless to attempt to locate their widely fluctuating dates upon our Calendars and Almanacs, especially when the precise date of the Birth of Christ is so doubtful.

The extraordinary tenacity with which the Jews have continued to use their complicated Calendar seems worthy of a better and more practical cause; but it serves to show how strongly they valued the original luni-solar Year as essential to their National Government and the first code conferred upon their race by Moses, who could not carry a pyramid for observations during his 40 years' journey through the Wilderness.

As its basis is of general interest some brief notice seems desirable.

JEWISH CALENDAR (A.D. 1900, A.M. 5660-1).

N.B.—The additional or 13th month Ve-adar comes in this year to adjust the Calendar to the Seasons—see the 13 moons recorded.

1900.	5660.		Fixed Dates.	Moons.
Jan. 1.	**New Moon**	**Sebat**	1	**1**
„ 31.	**New Moon**	**Adar**	1	**2**
Feb. 13.	(Usual date of Purim) ...	„	13	
Mar. 2.	**New Moon**	**Ve-adar**	*1*	**3**
„ 14.	Fast of Esther	„	13	
„ 15.	Purim	„	14	
„ 16.	Shusan Purim	„	15	
„ 31.	**New Moon**	**Nisan**	1	**4**
Apl. 14.	Festival of Passover ...	„	15	
„ 15.	„ „ 2nd day	„	16	
„ 20.	„ „ 7th day	„	21	
„ 21.	„ „ ends	„	22	
„ 30.	**New Moon**	**Yiar**	1	**5**
May 17.	Festival, 33rd day of Omer	„	18	
„ 29.	**New Moon**	**Sivan**	1	**6**
June 3.	Festival of Weeks (Pentecost)	„	6	
„ 4.	„ „ 2nd day	„	7	
„ 28.	**New Moon**	**Tamuz**	1	**7**
July 15.	Feast of Tamuz	„	*18*	
„ 27.	**New Moon**	**Ab**	1	**8**
Aug. 5.	Fast, Destruction of the Temple	„	*10*	
„ 26.	**New Moon**	**Elul**	1	**9**
Sep. 24.	**NEW MOON, 1st day of NEW YEAR, 5661**	**Tishri**	1	**10**
„ 25.	**2nd** „ „ „	„	*2*	
„ 26.	Fast of Guedaliah	„	3	
Oct. 3.	Fast of Expiation	„	10	
„ 8.	Feast of Tabernacles ...	„	15	
„ 9.	„ „ 2nd day	„	16	
„ 14.	Hosana Raba	„	21	
„ 15.	Feast of the 8th day ...	„	22	
„ 16.	Rejoicing of the Law ...	„	23	
„ 24.	**New Moon**	**Hesvan**	1	**11**
Nov. 23.	**New Moon**	**Kisley**	1	**12**
Dec. 17.	Dedication of the Temple	„	25	
„ 23.	**New Moon**	**Tebet**	1	**13**
The Fast of the Siege of Jerusalem folded over our New Year's Day in 1901		„	10	

Although the moon-governed months fluctuate, their *Festivals are held on* Fixed Dates *in the months*, *except the odd extra dates (shown by italics) in embolismic years.

NOTE.—All the Jewish Sabbaths, Festivals, and Fasts *commence the previous Evening at Sunset*, so that the New Moons sometimes are counted as falling a day later than upon our Calendar, *e.g.*, our New Moon of March 1st falls upon their equivalent of March 2nd, which begins the Jewish *inter-calated 13th month*, Ve-adar.

The Jewish Almanac in ordinary Years has 12 moons (months), *i.e.*, 354 days, but in "embolismic" Years, as in that for 1900 above, an extra month is inserted to bring the lunar (354 days) Year more into unison with the true Solar Year. In that way, "embolismic and anomalistic Years" vary, as the former may have 384 days, but the actual Year term is

further subject to adjustment to avoid certain Festivals (*which occur on fixed dates of the months*) falling upon Sunday, Wednesday, or Friday, as inconsistent days of the week, then the New Year commences a day later.

Hence even the Jews adjusted and still adjust their Calendars to secure the Festivals falling upon fixed dates of the month and to avoid inconvenient days.

Thus their Almanac has neither a fixed Solar time for commencing, nor yet a definite duration, but is dependent upon the impracticable idea of adjusting the Moon's motions to the Solar Year.

Of the Luni-Solar cycle of 19 years, 12 are *ordinary* (with about 354 days), and 7 (Nos. 3, 6, 8, 11, 14, 17, and 19) are *embolismic*, having about 384 days. Their 5,660th Year, being the 17th of the cycle, was 19 days longer than our Year 1900.

Their Year 5660 began on our September 5th, 1899, and as their era is assumed to date back to the supposed date of Creation, 3,760¼ Years B.C., the addition of 3760 B.C. to our 1900 A.D. = their 5,660th Year.

The beginning of their Year shifts with the Autumn Equinoxial Moon, but although their Year thus varies, they wisely adhered to fixed dates in such Almanacs for their Festivals.

Although the CHRISTIAN (Gregorian) CALENDAR, which was partially regulated by the above, is used by about one-third of the World's population, and is extending in use, whilst others are slowly falling into disuse, several Asiatic Calendars still serve to remind readers of the dwindling application of other Eastern Calendars with their confusing Eras.

THE CHINESE LUNAR RECKONING. (a)

As still used by about 500,000,000 persons.

Our **1903.**		Chinese Year **4600** had 13 months.				
July	24	...	7th month	1st day	29th year (b)	
August	23	...	8th	„ 1st	„ 29th	„
September	22	...	9th	„ 1st	„ 29th	„
October	22	...	10th	„ 1st	„ 29th	„
November	20	...	11th	„ 1st	„ 29th	„
December	19	...	12th	„ 1st	„ 29th	„
January	17	...	13th	„ 1st	„ 29th	„
Our **1904.**			Chinese Year **4601.**			
February	16	...	1st	„ 1st	„ 30th	„
March	17	...	2nd	„ 1st	„ 30th	„
April	15	...	3rd	„ 1st	„ 30th	„
May	15	...	4th	„ 1st	„ 30th	„
June	13	...	5th	„ 1st	„ 30th	„
July	13	...	6th	„ 1st	„ 30th	„
August	11	...	7th	„ 1st	„ 30th	„
September	9	...	8th	„ 1st	„ 30th	„
October	9	...	9th	„ 1st	„ 30th	„
November	7	...	10th	„ 1st	„ 30th	„
December	6	...	11th	„ 1st	„ 30th	„
1905.						
January	5	...	12th	„ 1st	„ 30th	„

(a) Computed by Jas. C. Macdonald, F.S.A. (Scot.) per the "Chronologies and Calendars" (Wm. Andrews & Co.).

(b) The present Emperor, Keang Hsii, ascended to the throne on 6th month, 5th day—12th January, 1895.

The above is of special interest from its conservative continuance (almost perpetuation) of the original lunation (month) "year," which seems to have been *the only possible "time-basis" the earliest men could reckon by*, **as already explained.**—*M.B.C.*

SUMMATION.

The Chinese, as do most Eastern people, observe lunar months, each month beginning with a new moon.

In order to provide for the difference between the Lunar and Solar Year, one month is added in every 30, so that the Chinese Year may begin any time between the 21st of January and the end of February.

Their year 4601 began on our 16th February, 1904, and contained 355 days. Their previous year, 4600, contained 383 days divided into 13 months, which included the inter-calary lunation.

The Chinese celebrate their New Year by festivities lasting 3 or more days, according to the individual's wealth. Work is suspended, debts paid, insolvents cleared by solemn ceremony after declaring that they have "no money."

The Japanese year begins at the same time as the Chinese. The inter-calary month always begins between the 20th and 23rd of the month, at about the same time of the year, and extends until the following new-moon.

Most Eastern people use the lunar month, and therefore begin each month about the same time. But as the Chinese day begins about 6 hours earlier than the Turkish, the Chinese Calendar often ranges about a day earlier than the Mahomedan Calendar which also serves a vast population.

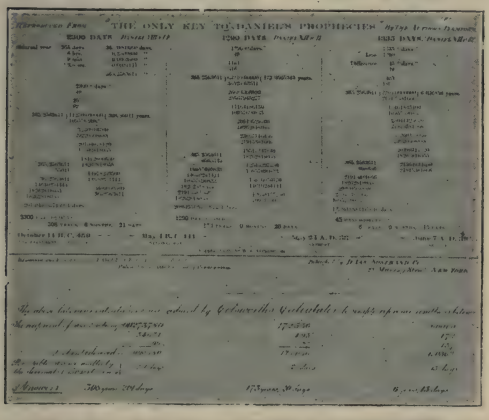
As the Moons are best observed during the night, and the Jews count the hours of their days from the previous evening at Sunset, their months usually begin a day earlier than those of the Mahomedans, whose Calendar is much the worst, because it fails to even apply the inter-calary (13th) month by which the Chinese and Jews keep nearer to the seasons; consequently the Mahomedan Calendar drifts the commencement of Mahomedan Years through all the Seasons of Nature's recurring year, with the disastrous result that the Agriculturalists, peasantry and producers upon whom national prosperity depends, are misled by doing similar work during the current year about the same Almanac dates upon which their Agricultural, etc., work was done during previous year, consequently they are generally and cumulatively encroaching 11 days (365 — 354 days in 12 lunations) earlier than the true Season.—Hence as Nature's penalty is just as bad for 11 days too early as for 11 days too late, we find that the progress of the Mahomedan people is thereby seriously retarded, and a lack of promptitude in their character results.

Until Eastern Races widely adopt Printed Almanacs, their scattered people will almost necessarily continue to use Lunar Months, which have too long retarded their progress, not only by the loss that nature inflicts as penalty for departure from the Agricultural Seasons, which depend upon the fixed Solar Year, but also by that baffling uncertainty which has such a deteriorating effect upon the national and individual character of peoples who have not adopted Nature's **Fixed Year,** to enable them to best arrange their work, etc., in due Season.

There is so much uncertainty amongst Chronologists about the actual time of the beginning of the Chinese and other Eras, and therefore of the Cycles and also the dates when individual years began, that it seems useless to attempt to fix many ancient dates, because the uncertain data prevents accurate conclusions.

It seems fairly evident that most Ancient Systems of Chronology were false and misleading until their respective nations found out and applied the Solar Year.

Therefore I submit that even if the efforts of Chronologers are continued for ever, they will *never* be able to re-arrange the past years of varied and unknown lengths, particularly as they have necessarily to depend upon the old records of ancient priests who had the interest of priestcraft, the superstitions of their people, as well as the interest of the State, to serve when they wrote, re-wrote and amended former records, or made public declarations, as described on page 172 *re* the Ancient Egyptian Chronicle. That appears confirmed by similar fabulous ages in the early Chinese Chronicles, the stratagem of Isaiah with the Dial of Ahaz, and the Oracle of Baalbeck as per page 180, to which we may reasonably add with regret, that remarkable use of the figures forming the Solar Year-unit of 365·2563611 days displayed in the prophecies of Daniel quoted below, when calculated out as follows from "Daniel's Prophecies," by Mr. W. S. Auchincloss (published by D. Van Nostrand Co., New York), which was written to prove the truth of Daniel, but in the light of the methods of the ancient priests, etc., I think rather tends to give his case away: —


THE ONLY KEY TO DANIEL'S PROPHECIES

CALCULATIONS *re* DANIEL'S PROPHECIES.

By W. S. Auchincloss.

That ancient tendency to mystically work the *year-unit* into priestly records is very characteristic of the early writings of the priesthood, and appears to have been a constant source of temptation to early scribes and priests when writing *after the event*, to impress the people by pre-dating past events as prophecies, as Daniel's prophecies may

have been, seeing that the oldest authenticated records extant of them appear to have been written after the time of Christ.—In that, however, let truth prevail.—I shall be pleased if reliable evidence arises to the contrary.

We know how the well-meant but erroneous Chronology of Bishop Usher and other translators who dated Creation in the Bible at about 4004 B.C., long retarded the progress of Geology, ideas of Evolution, etc.

Similarly the great Sir Isaac Newton's hasty conclusions as to the limitations of "lenses," long retarded the development of the Telescope, Microscope, etc.

That other great searcher after truth, Charles Darwin, wisely wrote:—"False facts are highly "injurious to the progress of Science, for they "often endure long; but false views, if supported "by some evidence, do little harm, for everyone "takes a salutary pleasure in proving their "falseness; and when this is done, one path "toward errors is closed and the road to truth "is often at the same time opened."—*Ex "Descent of Man," I.L. of F.L., page* 5931.

Following that advice, I have sought to support my case by the independent evidence of photographs and the indisputable records of scientists, investigators and travellers of repute. I even got entirely independent persons to secure the critical photographs of the Great Pyramid's Shadows, upon which so much of the Pyramid Section herein depends, it being my desire that truth may prevail.

We never hear of the foundation of the Christian era being used to testify to the reality of the inner power of Christianity; yet we cannot find anything more striking in history than the indisputable fact that within a short period after the crucifixion of the lowly Nazarene (who was despised by the Jews over whom the Romans ruled as conquerors) His life exerted such a power for good, that even the warlike Romans, who then governed the greatest empire of the world, deliberately dated back their records to the supposed birth of the Christ, and dated subsequent events in time from that date.

That is most cogent evidence of the early effect of Christ's teaching.

That Christ's birth should be the origin of the Era of Time which dominates the World, evidences the greatest and best influence affecting humanity. Our ideas of the force of that early power are largely increased when we remember the extreme tenacity with which old Almanac methods have been cherished, and the powerful superstitions which clustered round them, rendering men more averse to change, the further back they were in human history.

Some of the best authorities believe in different dates for that momentous event, some even holding that the difference from the beginning of our Era was not merely a few months, but went as far back as 3 or even 6 years before the accepted Era began, whilst others dispute as to whether Christ was born in the year 0, or 1 A.D.

That, however, need not trouble us in the least, as we should rightly feel very thankful that the Pontiffs and Papal authorities at Rome so wisely determined upon the fixed date of December 25th for Christmas Day, which we can all the more enjoy because there is no uncertainty about the date of its celebration for which we can prepare with Seasonable zest.

Christmas Day marks the most prominent *fixed* Festival Day in the Calendar.—As that *fixed* Feast is *the* great central date from which all the others are timed, and no inconvenience, but on the contrary far greater convenience arises from its fixity, we may fairly conclude that increased convenience and advantage would result if the other Festivals were similarly fixed for the convenience of all civilized people.

But there is a very decided inconvenience arising from the needless variations of the weekday names given to Christmas Day, and the consequent irregularities and confusion caused by that senseless splitting up of weeks, which we have so long put up with—as though no better alternative could be found.

The fact that Christmas Day fell on Sunday in the year 1904 showed the least possible difference under the existing system, as the work-days, Monday to Saturday, were kept consecutively intact.—Yet there were probably hundreds of thousands, perhaps millions of workers in this country, and untold millions more abroad (especially in America) who were thereby deprived of their greatly cherished yearly holiday, thus worked into Sunday, whilst salaried officials, commercial travellers, clerks, foremen, sailors, soldiers, naval-men, domestic servants, agricultural servants, together with all persons employed on monthly or longer periods of payment, were unwittingly deprived of a day's pay for the extra day's labour their employers indirectly extracted from them—**despite the indisputable fact that those servants had already worked the extra Leap-Day (February 29th) that year for nothing.**

Now in all seriousness, I say that it is neither right, just, nor necessary that those servants should toil two days extra for nothing, as they and their families have to pay for food, clothing, house rent, etc., whilst the employers are not only getting the regular profit from those labours, but also scooping up the amounts that should justly have been paid for those two days' work from which employers should only retain their normal profits.

The two days' extra pay unwittingly exacted through our defective Almanac from the salaried staff, for the dividends of our railway, etc., companies this 1904 year, might meantime be paid into their respective Superannuation and Pension Funds to help the pensions for aged servants.

That would come to a large sum, which would amount to some millions of pounds sterling if the two days' value was added from other employers—Indeed it would make a nice nucleus for deserving Old Age Pensioners.

If, therefore, employers will kindly absolve their consciences and earn the sweet sleep of the just, I invite them to hand over their

respective aggregate amounts thus wrongly retained from the workers, to the control of the Chancellor of the Exchequer, by paying it into the "Old Age Pension Fund Account" to be opened with the Bank of England—I will then undertake to provide a sound, equitable and easily workable scheme for mutually secured Old Age Pensions on economic lines, which will be fair to employers and members of every grade of society down to the humblest toiler, and yet just to all those helpful Trades Unions, Friendly and Provident Societies, as well as existing Pension Funds, which could thus be strengthened upon a broader and freer basis without injustice to anyone, or yet putting the slightest tinge of pauperism upon any worker.

On the contrary I believe it would go far towards encouraging true thrift and that upbuilding of stalwart character and vigour that makes for true greatness and prosperity in any nation, by inspiring a right sense of justice and hope amongst our toiling millions, without any gerry-mandering of Tariffs or political humbug calculated to mislead the deserving workers from working out their just rights to freedom on a sure basis, upon which the prosperity not only of the Empire, but also of Human Progress towards a better civilization can be assured.

It is an ignominious disgrace to our civilization, that deserving thrifty workers who mainly create the wealth of this the wealthiest nation in the World, should endure the bitter humility of being forced into the Workhouse or to Parish Relief in their old age, when they above all other people on earth have rightly earned peaceful repose for their last days, and should have real comforts, joys and loving care as their reward for life-long services to the community.

Sadly as I feel the bitter cry of the unemployed and the cynical letters written to the newspapers by some whose names will happily soon be forgotten (except so far as they are held in derision), I am certain that plenty of good useful work can be found for everyone who will do his share—but I advocate effective measures against hardened criminals and those who won't work after fair trials—as the community should protect itself against such dangerous degeneracy, by depriving those worthless people after, say, three convictions, of the power to perpetuate such vicious life and inflict unjust burdens upon deserving people.

Above all things let all reforms be based on justice to the deserving poor, and convince them that it pays to do their best. Esteem all deserving until proved unworthy, and so build up the best in all, by letting everyone depend upon his or her efforts in useful work.

But don't allow the self-reliance of our race to be undermined by those pernicious acts of injustice which lead some large employers and even railway magnates to inflict undue privations upon their poorest servants. To stop poor men's wages for 9 or 10 days at Christmas to bolster up dividends, inflicts needless cruelty upon worthy servants and their families at the most expensive and tempting time of the year, when fair business forethought and consideration could easily gain the same saving—even from the same people—by a holiday of one day per

month, or by spreading that hardship over, say, a month better worked only from breakfast times, so that the toilers could get well rested during those cold winter mornings, and be longer with their families.—Or even if the full holiday was given in harvest time, when labour is wanted in the villages, the health of the workman could be improved, and their families and our country better served, instead of running the grave danger of throwing these poor people needlessly into privation and debt, from which many may not have margin to recover in months or years to come.

If it be necessary to save any percentage let that come proportionately from the dividends, officers, clerks and all, to uphold justice and respect amongst all, and not allow Almanac anomalies and inconveniences to be thus abused to the serious injury of the poor who already suffer most unduly from them.

There is not the slightest need for despondency if only we earnestly set about the right way to restore the needed sense of justice amongst the workers.—There are plenty of good men and women workers to restore a good standard.

There is plenty of highly useful work requiring to be done, to which even the wastrels could be put to earn their daily bread.—Indeed we have such vast natural advantages now ripe for development that all could be so profitably employed that there would no longer be need for our toilers to go hungry and starved to work before breakfast, whilst great National Resources could thereby be conserved to such an extent as could develop our countrymen into the most prosperous nation, able to more than hold its own against industrial competition abroad, as I may show in a later pamphlet—probably no one else knows the plan I have in mind, but it cannot be detailed in this limited space.

But those Reforms, like that of the Almanac, depend primarily upon justice and public convenience, which can best be secured by faithful Parliamentary Representation, to gain which the payment of Members of Parliament seems the first essential step, so that the people can freely elect the best men from every constituency to carry out those high duties thoroughly, and not neglect the greatest duty of the State to foster the best social life of its people as now, when surely an Autumnal Session should have been held to deal with the vast arrears of Parliamentary work and crying social needs.

Men and women should rightly be paid for such honourable work, and promptly cashiered if they failed to rise to their responsibilities.—Then the people would be able to insist upon the work being done, whereas they cannot insist upon men working for nothing at those great problems necessary to develop the best modern life. The self-interest of far too many Members of Parliament seems to have blocked the powers of constructive legislation during recent years, with the result that injustices are not being removed, but rather extended, and as such re-act extensively amongst the people who suffer the injustices and inconveniences, which should be removed by Parliamentary and International enactments.

That is inserted to impress thoughtful educated people and the workers with the fact that Reforms to remedy Almanac-created and other injustices, must now almost necessarily spring from the masses who hold the voting power.

The confusion and inconvenience arising from the changing of the week-day names for Christmas is far more widespread than is generally imagined, as we all get more or less confused by it.

Why need Christmas Day fall on Monday in 1905, Tuesday in 1906, Wednesday in 1907, and Friday in 1908, splitting our usual weekly arrangements of all kinds, upsetting regular markets, disturbing the regular running of trains, steamers, weekly wages, and the other innumerable conveniences of our every week life, when by rationally making Leap-Day a Public Holiday and calling Christmas Day by its distinctive name, **without any week-day name being attached to it,** we could save all those irritating and senseless changes at present forced upon us without rational purpose? Is there any adequate advantage derivable from dividing the weeks amidst which Christmas falls? Surely not!—Neither is there any necessity for that cleavage.

But consider for a moment how great would be the public convenience which would result from simply arranging to name Christmas Day by itself always on the date corresponding to December 25th, with the Saturday and Sunday naturally falling before it and the Bank Holiday the day after it, so that all our worthy workers could thus permanently secure the full three and a half days' holiday undivided.

Would not that tend more to social happiness, when distant friends would find it worth their while to travel long journeys to meet their dear ones at that ideal time for family reunions, rejoicings, etc.?

That cherished privilege tends to increase that home happiness upon which the best life of our nation depends more than mere money; yet how many thousands are debarred from that longed-for privilege, when Christmas falls without the week-end advantages I propose to permanently attach thereto for our great gain.

Not only that, we should thereby gain the still greater advantage of making permanent the week-day names for all the same dates throughout every succeeding year, and never be bothered with Royal Proclamations altering the date for the King's Birthday celebrations because that birthday happens to fall near a Sunday, etc.

Is it not an absurdity that the day for public celebration of King Edward's Birthday, as the greatest ruler on Earth, is not recorded in our Almanacs, because the foolish change of week-day names for dates leaves only a hazy idea that it will be within a week from June 24th?

All our Birthdays, Markets, Fairs, Village Feasts, Monthly Meetings, Pay Days, Monthly Rents, Pension Payments, etc., would then fall on their respective week-day dates, and be instantly known by all, instead of being obscured and subject to senseless change as

now, if we merely set apart Christmas Day as the odd "Year Day" it really is, without giving it any week-day name.

Surely that greatest of days, from which the Christian Era is believed by so many to be dated, and is now **the only day upon which all Christian nations unite,** might be emphasized to celebrate the Birth of Christ and Christianity, which has done more to promote human happiness than all other faiths, and should be further enhanced with acclaim to a separate recognition to effect that noble and useful purpose towards furthering the unity and welfare of all humanity.

As explained in the Almanac Section, everybody would benefit by the public convenience that would result if the full Christmas holidays and week-end rest were thus **permanently** combined, and **fixed** week-day names assigned to all the Almanac dates for future time.

To keep the Years true to nature would also require the insertion of Leap Year Day as the duplicate Saturday, as per Almanac page 12.

Julius Cæsar's practical conception of a Rational Almanac actually provided for such duplication of the Leap Year day on February 23rd every 4th Year, without disturbing the day names of that week, which thus included an extra day: but as he did not provide for the adjustment of the 11 minutes 10 seconds excess, the natural time fell behind the reckoning, so that by Pope Gregory's time in 1582 the over-reckoning had accumulated to the 10 days then dropped in Latin countries.

Protestant England foolishly refused to accept truer science from the better-informed Pope until 1752, when 11 days had to be skipped, whilst the orthodox Russians have unfortunately resisted the change even until now. They will be soon compelled to leave out 13 days to put their Almanac right with the Seasons.—I call that resistance unfortunate, not only because of the until now foolish waste of time and confusion caused to Russian foreign traders, and all their European correspondents, who have meantime had to double-date all documents thus :—
31st Dec., 1904, in Russia,
13th Jan., 1905, in other European countries,
but also because I believe that the recording of those 13 days too early in Russian Calendars has so unwittingly misled the old style conservative peasantry in their times of sowing, etc., that the woful recurring famines have been greatly aggravated thereby, if not in some cases absolutely caused by that obsolete reckoning.

Still further advantages could be secured if the Governments and Churches would wisely decide to **fix** Easter instead of letting it drift confusingly between March 22nd and April 25th, according to the vague wanderings of the Moon.

Frankly the Churches, if they are to flourish and extend their usefulness, must recognise that the "Sabbath was made for man" and not that "man was made for the Sabbath," when they consider the rational counting of

the week-day names from Christmas Day as a Sunday, and further that the Moon wandering of Easter has long since ceased to serve any useful purpose.

No doubt that uncertainty caused by yearly changes formerly caused many people to go to Church, where the Almanac and Festival Times were declared before printed Almanacs were published, and in the early centuries when the illiterate people so extensively counted Time by the Moon's phases, it seems to have been a necessity.

But since then those causes have ceased to be effective, and we are confronted with the fact that Easter is now the longest public holiday of the year, and constitutes the great open-air holiday for the millions of our toilers who then need it most after their long toil through Winter.

The overwhelming importance of the Equinox to early Christian Observers and Calendar constructors, led them suggestively to fix the Easter Celebration of their Lord's death as hovering about the Equinox, when it could advance the interests of their Church by offering counter-attractions to the Pagan Festivals then held in honour of Flora, the Goddess of Spring, etc. The originators of Easter thus appear to have fixed it to suit public convenience then. Why should not we amend it to suit our convenience now and for all future time ?

Eminent authorities hold that our knowledge of the exact date upon which Christ was crucified cannot be traced, whilst even if that were exactly known, it would be manifestly impossible to celebrate the event on the precise date each year by any such Moon-wandering and week-day changing system of dates as now in use.

Therefore it is absolutely futile to longer continue that precarious, unsatisfactory and very inconvenient drifting of Easter, etc., dates.

Far better adopt the considerate, sensible and thoughtful plan suggested by the present World's greatest ruler, King Edward VII., who, seeing that his Birthday fell on November 9th, when the joy of its celebration would have been marred by chilly, cold and foggy weather, wisely proclaimed that in the interests of the people it should be publicly celebrated about Queen Victoria Day (June 24th) when the servants of the Crown, Government, Army, Navy, etc., together with the masses of the people can fully enter into the joyous delights of open-air Festivities, amid the balmy air and extended daylight then prevailing till late in the evening.

Surely when we realise such welcome advantages from a **five months' variation** in the celebration of the present greatest King's birthday whilst he is living, we should do well to further the best interests of the hundreds of millions of Christians (especially the poorer people) throughout the world by **fixing Easter about 5 weeks after the Equinox,** when brighter and more settled weather would combine with the then most glorious vegetation springing up all around, amidst which flowers and blossoms would further add splendour and gladness to increase that fuller glow of life which, as nature intended, always comes with the later Spring-

time to healthy people, who could then best appreciate that long Festive Holiday and bless the Church Authorities who gave it to them.

At present the Church is decidedly losing in consequence of the inconvenience which their irrational movement of Easter inflicts upon the people generally, who cannot appreciate why it should be drifted with the Moon.

FIXED and *MOVABLE* Festivals, Anniversaries, etc.

Note nearly all the 1905 Movable Festivals are 20 days later than in 1904.

NAME OF FESTIVAL. *Italics denote Movable Festivals.*	1903.	1904. LEAP-YEAR.	1905.
Epiphany	Jan. 6	fixed	
Septuagesima Sunday	Feb. 8	Jan. 31	Feb. 19
Quinquagesima, Shrove Sunday ...	,, 22	Feb. 14	Mar. 5
Ash Wednesday	,, 25	,, 17	,, 8
Quadragesima, 1st Sun. in Lent ...	Mar. 1	,, 21	,, 12
St. David's	,, 1	fixed	
St. Patrick's	,, 17	fixed	
Annunciation, Lady Day	,, 25	fixed	
Palm Sunday	Apl. 5	Mar. 27	Apl. 16
Good Friday	,, 10	Apl. 1	,, 21
EASTER SUNDAY	,, 12	,, 3	,, 23
Low Sunday	,, 19	,, 10	,, 30
St. George	,, 23	fixed	
Rogation Sunday	May 17	May 8	May 28
Ascension Day (Holy Thursday) ...	,, 21	,, 12	June 1
Whit Sunday, Pentecost	,, 31	,, 22	,, 11
Trinity Sunday	June 7	,, 29	,, 18
Corpus Christi	,, 11	June 2	,, 22
St. John the Baptist, Mid. Sum. Day	,, 24	fixed	
St. Michael, Michaelmas Day ...	Sept. 29	fixed	
Birth of King Edward VII.	Nov. 9	fixed	
Martinmas	,, 23	fixed	
St. Andrew	,, 30	fixed	
1st Sunday in Advent	,, 29	Nov. 27	Dec. 3
St. Thomas	Dec. 21	fixed	
Christmas Day	,, 25	fixed	
Independence, or *Anglo-Saxon* Day	July 4	fixed	
Federation Day			
Russian New Year—Greek Church...	Began	Jan. 13	Jan. 14
Mahomedan New Year	Began	—	Mar. 18
Jewish New Year	Began	Oct. 2	Sept. 10

Further we should remember that when Easter was fixed, the great bulk of the then Christian people were located around the coasts of the Mediterranean Sea, whereas now the dominant peoples reside further Northwards in Europe and America, where the changes of temperature at that most changeable period of the Year, inflict upon the people such temptations and dangers to health as it is certainly neither in the interest of the Churches nor Christianity to continue.

Indeed there is strong reason to believe that if the Churches do not quickly realise and remedy that danger, the bulk of the people will soon decide to work through Easter, and hold their holidays towards mid-summer, as the people in the United States are increasingly (now almost entirely) doing, regardless of Good Friday or any of the great Easter Festivals by which the Churches formerly used so successfully to recruit and sustain their ranks.

Easter is scarcely noticed in America, and is rapidly losing its Church influence in Europe, where it will gradually fall into disuse if the Churches do not soon realise that Easter was made for men, and not men for Easter.

I state that belief from the greatest of all reasons, namely, that the needless change of Easter Dates is against common-sense

convenience, and is inflicting great loss and inconvenience upon the people, without conferring any compensating advantage.

Reference to the Nautical, Whittaker's, or any Shipping Almanac establishes the fact that during the Easter Range of 34 days (March 22nd to April 25th) the Sun increases in elevation and power by 13° 8′, whereas it takes almost twice as long (from April 17th to June 21st) to correspondingly increase 13° 8′, indeed the climatic changes during the Easter Range about equal to those experienced between April 17th and August 26th (131 days), or from October 20th to February 23rd (126 days).

That may at first seem incredible to some readers who do not study Meteorological evidences, which confirm that rapid change about Easter by the average temperature rising 7°, from 41° on March 22nd to 48° on April 25th.

That 7° is 27%, or more than a quarter, of the 26° range of Average Temperature between the 36° lowest in Winter and 62° highest in Summer.—In other words, the Average Temperature rises ·206° per day during the Easter Range, compared with ·142° per day average throughout each half-year even when the Equinoxial Speeds of March and September are included.

But if we separately compare the Easter 34 days' range of ·206° per day with the ·129° per day for the other 147 days of the half-year, the Average Temperature during the Easter Range is found to rise 60% faster than the others.

Therefore the Temperature alone shows an Eastertide increase of warmth per day more than half as fast again as during the whole range of the other days in the year.

The result is that vegetation, then springing up after its Winter rest, shoots up during Easter at its most rapid rate, and as Easter has always been regarded by agricultural labourers, etc., as synonymous with the advent of Spring, they then habitually cultivate their gardens and plant potatoes, etc., because the Easter holidays furnish the available time, whilst many can also get the friendly help of relatives who then get home from our towns.

When Easters fall early, they are generally followed by casual frosts, which often ruin the early crops and lead to disease and potato famines, such as have been so sadly experienced in Ireland.

Such losses are simply the penalty which Nature exacts because our Governments and Churches are so foolish as to put the great Easter Holiday so early and wander it, thereby misleading the poor people into that temptation.

Even if Easter always fell early the harm would not be so great if its date was truly fixed, as then experience would teach the poor labourers, etc., not to plant until the end of April.

But now that the great bulk of the workers are compelled to live in large towns where their constitutions are consequently weakened by being cooped up in close factories and densely populated areas where the vitiating atmosphere lowers their vigour, this drifting of Easter constitutes a vital national danger to the health

of the coming generations, because the young people, after the long Winter's work and confinement indoors, being tired of hot theatres, music halls, etc., naturally look forward with delight to their longest open-air holiday at Easter.

Through many generations they have been traditionally taught to regard Easter as ending Winter and beginning Spring, and the vast majority of workers then don their new best thinner clothes, leave off overcoats, etc., with the appalling result that more serious colds are inflicted at Easter than any other season, thus further weakening so many already lowered constitutions to become prey to consumption and other diseases.

We then change our national games from active Football to the more standing game of Cricket with similar risks, when surely it would be far wiser and more convenient for everybody if Easter's wanderings were stopped, and its date fixed at a later warmer and more settled season.

Where can adequate reason be found for moving Easter Sunday from April 3rd in 1904, to April 23rd in 1905 ?

Easter Holidays may be expected to be more enjoyable in the warmer weather of April 23rd than 20 days earlier. To that extent it is hoped that Easter in 1905 will serve as an object lesson, showing the advantages of late Easters.

Is there any sense or reason compelling us to make the Winter Parliamentary Sessions, Law and University Terms, etc., 20 days longer in 1905 ?

Are we not doing that from silly tradition, instead of because we like it or because it is good for us ?

Why should Easter fall back to March 31st in 1907 and March 23rd in 1913, when the cold March winds blowing will prevent poor people from thoroughly enjoying their well-earned holiday ?

Why do we allow it to be thus shifted about to our confusion and loss during that then prevailing most changeable weather of the year ?

Why do we allow it to disturb our Term Periods for Business, Schools, Colleges, Universities, Law Courts, Parliament and Public Holidays, Feasts, Fairs, Markets, etc. ?

Why should we longer continue that foolish, unprofitable and inconvenient drifting of Easter ?

Surely every reasoning person should see that the time has now arrived when we should make an effort to rid ourselves of that antiquated vacillating movement of Easter, which also disturbs Whitsuntide and all its contingent Festivals nearly throughout the Year.

That Moon-wandering system has long ceased to be of any real advantage to us, and is increasingly becoming a dangerous, injurious wasteful and highly inconvenient custom.

I need not enlarge upon the many and serious business difficulties caused thereby, as they are outlined in the Almanac Section, together with some instances of the waste and needless labour involved by our absurd system of uneven months.

The erratic months with changing week-day names also quite unnecessarily disturb our Quarterly arrangements. Instead of having the simple 13 weeks per Quarter and 52 weeks per Year, we had 53 Saturdays in 1904, which made a considerable difference to weekly newspapers, news sellers and all the myriads of interests affected by Saturday markets, etc.

Not only that, during the last three months of 1904 there were 14 Saturdays, whereas during the first 3 months of 1905 only 12 Saturdays occur.

Why should there be 17 per cent. more Saturdays in the former Quarter than the latter? Is it not absurd?

Beyond the absurdity there are very decided inconveniences caused by such erratic terms. They cause undue difficulties, and give rise to worry and unfair imputations which should not exist.

For instance, I know personally of quite a number of Newspaper Proprietors, News-vendors Booksellers and Stationers who have had many of their accounts for the Quarter ending Dec. 31st, 1904, returned because 14 weekly papers were then charged for. Customers said they were over-charged—some going so far as to stop their accounts, saying that they were being imposed upon. Those people will be again needlessly confused by there being only 12 Saturdays in the first 3 months of 1905.

How much simpler it would be for everybody if we only had 13 weeks and so always 13 Saturdays in each Quarter as herein suggested.

If the reader's limited experience or time does not enable him to realise the great waste of labour and mental efforts inflicted by our imperfect Calendar upon large industrial concerns, such as Railways, Manufacturers, etc., a little reflection will enable him to understand something of the constantly recurring convenience which would result to everybody from the simpler Calendar of even months, etc., herein suggested, if he merely thinks of the innumerable references to Almanacs that he with all other people could thereby save, and the much better holiday conveniences which would be conferred by the week-end advantages added to Christmas, Fixed Easter, etc.

Every business manager of Railway, Shipping, Manufacturing and Industrial Companies and Firms, knows the waste of labour and detail required to adjust their accounts each quarter or half-year, whilst Actuaries, Auditors, Accountants, etc., have to struggle through and each time find separate solutions for those difficulties, which could be very easily and entirely avoided, if we adopted the **Rational Almanac,** based upon even months of four weeks each, with " Christmas Day " and " Leap-day " treated as holidays without any week-day name.

That would gain an ideal sub-division of our 52 weeks in the year, whilst also maintaining the present length of year to keep the seasons true. It would result in such immense convenience to everybody, that we cannot under present conditions form any adequate conception of the manifold advantages which humanity could thereby realise for their future welfare.

EVEN MONTHS OF 4 WEEKS EACH DESIRED.

We shall realise some of the advantages of late Easters and Whitsuntides in 1905, as the warmer weather about April 23rd and June 11th will make those well-earned holidays far more enjoyable and health-giving than can be reasonably expected during years when the Festivals fall about five weeks earlier.

As further distinct advantages and great public conveniences could be gained by fixing permanent dates for those Festivals, on those exact dates upon which they will again fall in the usual course for the year 1916, I propose that we should give the Almanac Authorities notice of our desire to then put into force the Rational Almanac to suit 20th Century needs throughout all Christian Countries, in the hope that even Oriental Countries may adopt it for international purposes and ultimately apply it universally.

That 11 years' notice seems appropriate, as it practically represents the 11 years' recurring period, which brings the Festival, etc., dates back to the same datal locations in the Almanac (subject to slight variation) by that mystic blending of the Metonic Cycle (co-ordinating the conjunctive motions of the Sun and Moon), with the Gregorian Leap-Year Adjustment upon which the Almanac is based, as may be seen from the following comparisons extracted from the English Church Common Prayer Book :—

Year.	Easter Sunday.	Whit-Sunday.	Recurs exactly 11 years later in the year
1905 ..	April 23 ..	June 11 ..	1916
1907 ..	March 31 ..	May 19 ..	1918
1910 ..	March 27 ..	May 15 ..	1921
1911 ..	April 16 ..	June 4 ..	1922

The growing requirements of all Governments, Municipalities, Commercial Interests, etc., for simpler business and statistical comparisons, will encourage the Statesmen of Civilized Communities to unitedly carry this Reform through quickly when they realise that it will bring mutual advantage to all, including the Churches, who will ultimately be led to favour the change—hence the 11 years' efforts may suffice if enlightened people will kindly co-operate to advocate and so secure this desirable Reform by the year 1916.

As 4 weeks would then complete a month, and the week-ends and pay-days remain constant each Month, Quarter, Half-Year and Year, it would then be easy for all business accounts to be balanced without any adjustments, etc., as the periods of earning and expenditure would become equal, whilst, further, they would from that time become permanent for exact comparison with any corresponding periods in past or future years.

That would be a decided gain to business convenience, especially to small manufacturers, upon whose competition we depend for keeping down prices, as they would be relieved from their present danger, periodically accruing through our irrational Almanacs, by which employers are taxed to provide 5 weekly wage payments out of the previous shorter month's sales.

On the other hand the months of 4 weeks each would confer a much-needed boon upon the vast numbers of Shopkeepers, etc., so many

of whom are now feeling the burden of rates and taxes so keenly that they are being left without money margins to meet the payments for goods purchased in 5 week-end months, when due during the 4 week-end month following, as the weekly sales to their customers do not then realise proportionate amounts.

Indeed, we may fairly say that the irregular Months of the existing Calendar handicap deserving business and workpeople when trying to improve their positions by developing small businesses where capital is limited.

Not only that, every householder and housewife dependent upon monthly salaries, allowances, etc., feels the pinch when 5 weekly payments for groceries, etc., have to be made out of one-twelfth of the year's money, as 5 weeks = 10 per cent. of the year, whereas the monthly salary only provides for 8 per cent. of the year's money.

The division of the year into 13 Months of 4 weeks each, by simply inserting a 4-week month between June and July, whilst also limiting the other 12 months to 28 days each, would complete an ideal Calendar, if we fixed Easter and decided upon the inclusion of the separately named Christmas Day in the last week of the year.

Then everybody could enjoy that every-day convenience which would result from that simple Almanac which we could all so easily keep in mind when based upon the convenient unit, the week which would then always recur its days upon the four fixed dates of the model months of four weeks each shown upon the Title page, so that we could without any appreciable mental effort always remember the dates for every day in the year, because the week-day names would in future be repeated **in identically the same positions** throughout every month and year, as regularly as they now recur each week.

Think what an immense advantage that would bring !

At present we have all to individually refer to Almanacs hundreds of times each year, whilst many have to refer thousands of times to fix dates and ascertain how the week-days then recur, because the absurd varying days terminating our erratic months destroy that simplicity of arrangement which should regulate the Calendar for public convenience.

Estimating only an average of one daily Almanac reference to the 2,000,000,000 people in the world, we find the colossal number of 730,000,000,000 needless references caused by our defective Almanacs.

We can save all those and far more by the simple change proposed herein.

There is nothing to fear from the silly superstition of a few weak-minded people, who would surely not be so foolish as to let 13 months a year make them apprehensive, when they have so long been enduring the four-fold agony of 13 weeks in each Quarter of the Year.

Neither would there be any such difficulty as was experienced when the last Calendar Reform, instituted by Pope Gregory XIIIth in 1582, was made by leaving out 10 days in Europe and 11 days in England, when the

peasantry were without education, and believed that they were being robbed of those days.

Though that false cry was then raised, there can hardly be found any thoughtful person in the civilized world who is not now fully convinced that the Reform was wise and a benefit to humanity.

But in the far simpler changes now proposed, there would be no such difficulty, as all could be arranged to run on much more smoothly than at present, yet we should gain very much more in practical convenience.

Pope Gregory's Reform hardly appreciably improved the every-day convenience of the Almanac for the people, whereas it is submitted that this suggested Reform would confer a thousand-fold more appreciable benefits upon humanity.

Pope Gregory's valued Reform, by leaving out 11 days, re-adjusted the year to the Equinox, and arranged to maintain it by eliminating the day unduly gained each 400 years, which cynics said "did not matter and people could never feel nor need it," though past history and the present experience of the Russians, etc., belie those cynical views.

The suggested Reform would confer far more advantages than the saving of our myriads of useless references, though those averaged at one per day for, say, the 500,000,000 persons of European descent alone = 182,500,000,000 —an almost incredible number of needless little worries.

Beyond that it would tend to remove much anxiety and distress now indirectly caused by our irrational, irregular Almanacs.

Surely the mothers of our race deserve and should receive our greatest consideration and compassion during their travail. The mental anxiety and distress suffered by the poor mothers of our working classes (especially before their first child is born), when husbands are at work and friends far away, is needlessly increased by that uncertainty which the varying periods of our months inflict upon those who should claim the first consideration of all governments.

Experience amongst the deserving working people convinces me that Almanac uncertainty seriously harms those worthy women, who are still more cruelly left defenceless because our Governments do not provide for the proper care, nurture and training of women for their noblest duty to the State as wives and mothers. Nor yet insist, as they should, upon all husbands giving a fair share of their earnings to keep their wives and children amply provided for.

Why do we allow drunkards, vicious and selfish men to sacrifice their wives and children to become burdens upon charitable and thrifty people? And why are all local rates burdened upon householders, thus crippling wives and children, when they should be levied increasingly upon the unmarried by deductions made through their employers, in view of the fact that they use our streets and public conveniences most?

It would not be appropriate here to deal further with that "flaw in our civilization," beyond stating my firm conviction that the suggested reform would be well worthy of being carried through, if it only lessened that motherly

anxiety by then letting those dear women know clearly that the 280 days' period of their labour should mature on the same day of the proposed style's 10th month from the current month's date of the event, as shown on Almanac page 33.

No doubt many lives could be saved thereby.

Why should we longer mislead such poor mothers by the existing defective Calendar's crude 9 months' period varying from 273 to 276 days instead of so easily and frankly helping them to understand the true 280 days' period?

The injustice inflicted by the existing clumsy Almanac upon poor people is evidenced in our County Courts, which of necessity have to award monthly payments on the basis of 4 weeks, because wages are paid weekly.—Many homes have been ruined, and persons driven to despair through being Court-crippled by the unfortunate irregular months we have endured too long.

From Almanac page 34, I have shown some ways in which our unsatisfactory Almanacs create needless work and confusion amongst railway and general business accounts, and traced that fruitful source of Stock Exchange, etc., gambling for the Almanac-created fluctuations, which, like recurring tides, give rise to and keep going that senseless evil which does so much injury to the working classes, and leads to such vast numbers of thrifty people being robbed by those cute sharks of the Stock Exchange, who live largely upon the gamble caused by the present erratic Almanac months, etc.

Such irregular periods tend to Stock Exchange gambling, as may be understood from the tables on Almanac pages 37, 38 and 39, which show those differences created by unequal earning periods, encouraging Exchange gamblers to grasp for the gain derivable from those fluctuations inflicted by our present imperfect Almanacs.

The there shown £710,000 Almanac-created gambling tide in British railway accounts this year becomes an enormous gambling lever of many millions when other industries, etc., are added, and the like extended to America and other countries over which international Stock Exchange transactions prevail.

That re-acts upon the money market causing the rate of interest to rise, crippling praiseworthy families when struggling to buy their homes, as they are then mulcted not only by higher interest, but also further mortgage and solicitors' charges, etc.

Thus we see that the deserving poor are constantly handicapped by our erratic Almanac, which lends itself to the scheming of wily people, who thus without doing productive work increasingly live at the expense of our toilers.

We shall find the customary booming of Mining, etc., Shares after next March's earnings are compared with "the previous month's record," but those wily ensnarers will be careful not to point out that March then has 27 working days or 12½% more than February's 24 days.

Much more might be adduced if time and space admitted, but I must now bring this book to a close for issue this Spring.

I had hoped to sell the book at 1/-, but the full work has necessarily been so costly that I cannot bear the loss that would entail, though

I would gladly sell at 1/- if any well-wishers would come forward to defray sufficient of the cost incurred, because I feel that the Reform would more quickly be secured by a 1/- publication, which is more easily within the reach of thoughtful workers than the 5/- I am reluctantly compelled to charge for the full book to cover printing and publishing expenses.

The costs referred to are those mainly of printing and publication, which are open to inspection.

Beyond those, heavy demands have been made upon my life's savings by the inevitable costs incurred in the production of works of this kind through research involving travel, protracted experiments and personal investigations.

I may try at an early date to meet the poorer people by issuing this "Summation" of the Pyramid, etc., Section, with the front portion of the whole work as an abridged edition for 1/-, and later hope to issue a more concise edition. But in this first publication I feel compelled to explain my reasons and arguments, to avoid that otherwise inevitable correspondence which it would be impossible for me to undertake, as it would fetter me from doing the effective practical work needed.

I shall, therefore, only deal with such letters as may be found likely to help us to secure truer Almanac Reform.

The suggested date of Christmas, 1916, is advocated as most suitable, but if the great international work cannot be carried by then, any later Christmas Day happening on a present style Monday would serve when ripe for Reform, as the change could then be almost imperceptibly made, and if needs be the separation of Christmas Day to ensure permanent dates for week-days through future years could be first arranged.

Such matters of interest as the great Almanac purpose of the Pyramids, Sphinx, Obelisks, Vertical Stones, Druidical Circles, the Mounds of Silbury Hill, Maes-howe, etc., as also the evidences of "Changing Latitude" and its bearing upon geological research, have all arisen through these investigations into the Origin of the Almanac, and therefore had to be inserted in the interest of truth to convince enquiring minds and avoid correspondence.

With the like desire to aid the cause of truth, the remarks herein explaining the natural Solution of the Early Bible Ages of Men, Dial of Ahaz, etc., have been recorded as they occurred to my mind, in the hope that whilst those lend added interest to the great question of Almanac Reform, they may lead thoughtful minds to reflect that the sources of truth in God were not merely confided to the Patriarchs and Apostles of 1,900 and more years ago, but are ever increasingly open to those who most earnestly seek to cultivate and ennoble the highest experiences of human life, and thereby encourage the willing from all classes to realise the real joys of life, through which all that is best in human nature can happily respond to God.

It is most sincerely hoped that practical discussions hereon will be focussed upon the consideration of the economic and public convenience of the people, apart from religious

bias and party strife, which have too long impeded true progress and reform. Then it will be far easier for the Papal Authorities who have hitherto controlled the Calendar, to peacefully and beneficially request the co-operation of the various Governments for their mutual benefit and the greatest advantage of mankind.

That would make a distinctly advantageous step towards international unity, and probably lead to the Russian, etc., Churches adopting the improved Calendar. Then the waste of time, money, and contingent losses to shipping, Continental railways, business, etc., caused by their Christmases, Easters, etc., being repeated or duplicated 13 days after ours would be avoided.

Thoughtful men in every country who desire the collective welfare of their people and humanity, should strive to impress the minds of their ministers and rulers with the manifest advantages which would result from Almanac Reform—as all countries would equally gain thereby.

They could be greatly helped by the Press writers, who would do well to direct public attention to these matters which affect the people's welfare more closely than is generally imagined.

Indeed careful consideration of the great Social Problems which confront us to-day, and are rapidly becoming more pressing, will show that their solution could be greatly facilitated if our Rulers and Parliaments first helped to Reform the Almanac.

Then the great Problems of Old Age Pensions, Housing of the Poor, etc., could be more simply worked on a thrifty basis of mutually just payments for and from all classes, as those whose incomes were received Monthly, Quarterly Half-yearly or Yearly could more equitably pay in with the weekly wage earners, when months of 4 weeks each are adopted.

Therefore it is hoped that the Rulers of Europe and America particularly, will consider these proposals in the interest of their peoples, then as indicated on Almanac pages 63 and 64, it will be found far easier to accomplish this Reform for our mutual advantage, within a reasonably short time.

To that end I cordially invite the co-operation of all who truly wish to advance this highly desirable Reform which would save such immense waste of troublesome references, needless labour and inconvenience to us all, and give those useful advantages to business and social life which would prove to be far more beneficial in practice than can be indicated in book form.

Whilst doing all possible so far as my time and means allow, it must be obvious to all readers that world-wide propaganda, translations and arrangements abroad, far beyond my limited means, will be required to accomplish this task, hence, in the cause of Almanac Reform I invite all friends of progress to help, and request all readers to fill up the attached Voting Card now, hoping that such as are able will contribute and use their influence towards this object, with the assurance that all such amounts received shall be publicly acknowledged, audited

and applied for this great purpose, which can and shall be accomplished if you will kindly advocate its practical utility amongst friends.

After reading this "summation" you may, with mutual interest and advantage, impress upon your acquaintances the immense pyramid, etc., labours and thoughtful research by which our now common Almanac was developed for our great good, and how highly Almanac knowledge was prized by Ancient Peoples. Then you can easily prove from the immense increase in Almanacs, Diaries, etc., during recent years, how much more valuable and incomparably more frequently needed now are those improved Almanac facilities which are outlined inside the front cover, and can be so readily gained to facilitate business, public and social convenience for us all, whilst benefiting humanity throughout the world, without prejudice to anyone.

How could early men manage their times of sowing and general arrangements of life without an Almanac?—Such an all-important need of humanity was surely ample cause for the enormous labours of the Egyptian Pyramid builders, and fully warranted even their vast expenditure of human labour and treasure, when their methods of observation involved constructions on such a huge scale to ensure reliable Almanac results. That was necessary owing to the Equinoxial shadows being cast so close to the Pyramid's base, thereby limiting the shadow-areas at all low Latitudes—where the clear climate and bright sunshine best enabled early peoples to experimentally "feel their way" during those imperative investigations of the Year's term which then could only be precisely solved by studying the most effective Sun-shadows. Those could not be differentiated with sufficient accuracy until successive pyramids were raised to such vast heights as magnified or elongated the Equinoxial shadow differences till they could be discriminated to establish the Year's term.

As the Papal Authorities have hitherto directed the Calendar, it is hoped that they will be induced to take the initiative towards conferring these desirable Almanac facilities by inviting Representatives from all Governments to secure Reform.

That would gain prestige to the Church, and prove to the vast and increasing majority of persons who do not attend places of worship, that the Church has the interest of the people at heart, otherwise the controlling power of that growing majority will ultimately lead to their disregarding the Church Authority, as already evidenced by the Easter Festivals being ignored in America, and decaying in Europe.

After reasonable time has been allowed for consideration, negotiations will be opened with the Papacy, but unless those Authorities indicate by Christmas, 1910, their willingness to carry this needed Reform, then the President of the United States will be requested, through the Universities, to call a Conference of Representatives from all Nations, to decide upon carrying out such Almanac Reforms as shall be deemed best for public and international convenience,

I earnestly desire your cordial support towards improving our Calendar, which has engrossed the most thoughtful minds of mankind throughout all Ages.

Although the two best known benefactors towards Almanac Reform are Julius Cæsar (46 B.C.) and Pope Gregory the Great (1582 A.D.), I submit that whilst all honour is due to them for responding to the growing Almanac needs of their generations, their great work was incomparably easier and less urgent than the stupendous labours and researches of those mighty Pyramid, etc., builders, in Egypt, Babylonia, India, etc., who thereby firmly laid the basis of our System of Time in all its varied forms of Years, Months, Week, Days, Hours, Minutes and Seconds, from the fleeting and almost inscrutable forces of nature, which were then so difficult to understand, that we inheritors of the accumulated knowledge thus born and developed through countless generations, cannot fully appreciate those protracted labours and untold mental efforts, through which early men struggled during the Evolution of their Ideas of Time, until they ultimately developed our Almanac.

Its history thus epitomises human Evolution, and should stimulate us to grateful efforts towards perfecting their great work and ridding ourselves from its antiquated anomalies and cumbersome irregularities in day names for recurring dates, which involve such numerous and troublesome references and waste labour, that Julius Cæsar never contemplated would be allowed to encrust and cripple its fuller utility during nearly 2,000 years of the world's most rapid progress, which has been so intensified during the last few years, that the time has now arrived when we should do our duty by completing our Almanac arrangements to better serve the growing requirements of 20th Century life.

WILL YOU HELP, PLEASE? If so, kindly fill up and send the enclosed card early to

Yours in earnest effort,

M. B. COTSWORTH, Acomb, YORK, England.

Difficulty having been experienced by advocates of Almanac Reform in identifying the writer when met on arrival in other cities and abroad, it has been suggested that the above photo-block may expedite identification, and facilitate intercourse with persons who may desire to exchange ideas when they come in contact with the writer.

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Jan.	Day.	Jan.	Feb.	Day.	Feb.	Mar.	Day.	Mar.	Apr.	Day.	Apr.	May.	Day.	May	June.	Day.	June	July.	Day.		Aug.	Day.	July.	Sept.	Day.	Aug.	Oct.	Day.	Sept.	Nov.	Day.	Oct.	Dec.	Day.	Nov.
1	S	1	1	W	4	1	W	4	1	S	7	1	M	9	1	T	12	1	S	14	1	T	17	1	F	20	1	S	22	1	W	25	1	F	27
2	M	2	2	T	5	2	T	5	2	M	8	2	T	10	2	F	13	2	S	15	2	W	18	2	S	21	2	M	23	2	T	26	2	S	28
3	T	3	3	F	6	3	W	6	3	T	9	3	W	11	3	S	14	3	M	16	3	T	19	3	S	22	3	T	24	3	T	27			Dec
4	W	4	4	S	7	4	T	7	4	W	10	4	T	12	4	S	15	4	T	17	4	F	20	4	M	23	3	W	25	4	F	28	3	S	1
5	T	5	5	S	8	5	F	8	5	T	11	5	F	13	5	M	16	5	W	18	5	S	21	5	T	24	4	T	26	4	S	29	4	M	2
6	F	6	6	M	9	6	S	9	6	F	12	6	S	14	6	T	17	6	T	19	6	M	22	6	W	25	5	F	27	5	S	30	5	T	3
7	S	7	7	T	10	7	M	10	7	S	13	7	M	15	7	W	18	7	F	20	7	T	23	7	T	26	6	S	28	6	M	31	6	W	4
8	S	8	8	W	11	8	T	11	8	M	14	8	T	16	8	T	19	8	S	21	8	W	24	8	F	27	7	S	29	7	M	Nov 1	7	T	5
9	M	9	9	T	12	9	W	12	9	T	15	9	W	17	9	F	20	9	S	22	9	T	25	9	S	28	8	M	Oct 1	8	T	2	8	F	6
10	T	10	10	F	13	10	T	13	10	W	16	10	T	18	10	S	21	10	M	23	10	T	26			Sep	9	T	2	9	W	4	9	S	7
11	W	11	11	S	14	11	F	14	11	T	17	11	F	19	11	S	22	11	T	24	11	F	27	10	S	29	10	T	3	10	F	6	10	S	8
12	T	12	12	S	15	12	S	15	12	W	18	12	S	20	12	M	23	12	W	25	12	S	28	11	M	30	11	F	4	11	S	7	11	M	9
13	F	13	13	M	16	13	M	16	13	T	19	13	S	21	13	T	24	13	T	26			Aug 1	12	T	31	12	S	5	12	M	8	12	T	10
14	S	14	14	T	17	14	T	17	14	F	20	14	M	22	14	W	25	14	F	27	13	S	1	13	W	4	13	M	6	13	T	9	13	W	11
15	S	15	15	W	18	15	W	18	15	S	21	15	T	23	15	T	26	15	S	28	14	M	2	14	T	5	14	T	7	14	W	10	14	T	12
16	M	16	16	T	19	16	T	19	16	S	22	16	W	24	16	F	27			Jul	15	T	3	15	F	6	15	W	8	15	T	11	15	F	13
17	T	17	17	F	20	17	F	20	17	M	23	17	T	25	17	S	28	16	S	1	16	W	4	16	S	7	16	T	9	16	F	12	16	S	14
18	W	18	18	S	21	18	S	21	18	T	24	18	F	26	18	S	Sol	17	M	2	17	T	5	17	M	8	17	F	10	17	S	13	17	S	15
19	T	19	19	M	22	19	S	22	19	W	25	19	F	27	19	M	30	18	M	3	18	F	6	18	M	9	18	S	11	18	M	14	18	M	16
20	F	20	20	M	23	20	M	23	20	T	26	20	S	28	20	T	31	19	W	4	19	S	7	19	T	10	19	M	12	19	S	15	19	T	17
21	S	21	21	T	24	21	T	24	21	F	27			Jun	21	W	3	20	T	5	20	S	8	20	W	11	20	T	13	20	M	16	20	T	18
22	S	22	22	W	25	22	W	25	22	S	28	21	S	1	22	F	4	21	F	6	21	M	9	21	T	12	21	S	14	21	T	17	21	W	19
23	M	23	23	T	26	23	T	26			May	22	M	2	22	S	5	22	S	7	22	T	10	22	F	13	22	S	15	22	W	18	22	F	20
24	T	24	24	F	27	24	F	27	23	S	1	23	T	3	23	M	6	23	S	8	23	W	11	23	S	14	23	M	16	23	T	19	23	S	21
25	W	25	25	S	28	25	S	28	24	M	2	24	W	4	24	T	7	24	M	9	24	T	12	24	S	15	24	T	17	24	F	20	24	S	22
26	T	26			Mar	25	T	3	25	T	5	25	M	7	25	W	10	25	T	12	25	F	13	25	M	16	25	W	18	25	S	21	25	X	X
27	F	27	26	S	1	26	T	4	26	F	6	26	M	9	26	T	11	26	W	13	26	S	16	26	T	17	26	T	19	26	S	22	26	M	23
28	S	28	27	M	2	27	T	5	27	S	8	27	T	10	27	F	12	27	T	14	27	M	17	27	W	18	27	T	20	27	M	23	27	T	24
		Feb	28	T	3	28	T	6	28	S	9	28	S	11	28	S	13	28	T	15	28	M	18	28	T	19	28	T	21	28	T	24	28	W	25
29	S	1				29	T	7	29	S	10	29	M	12	29	M	14	29	F	16	29	T	19	29	T	20	29	F	22	29	W	25	29	T	26
30	M	2	L			30	T	8	30	S	11	30	T	13	30	T	15	30	S	17	30	W	20	30	F	21	30	S	23	30	T	26	30	F	27
31	T	3				31	F	9				31	W	14				31	S	18	31	T	21				31	S	24				31	S	28

N.B.—The groups of three columns between the heavier rulings represent the calendar months of the present and proposed Almanacs as indicated by their—1st columns which show the dates for 1905 and 1916,
2nd columns denoting the days of the week, whilst the
3rd columns give their equivalent dates in the
proposed 13 months' calendar.

It will be noticed that the insertion of the proposed "new month" would **equate** *the year by gradations through each of the present 12 months; the difference increasing to 14 days at July 1, thence decreasing to re-union at Christmas.*

Below are given the comparative dates of the Holidays and customary Festivals. *The dates under the "Proposed Style" are exactly as they fall in 1916, except that Whitsuntide is suggested a week later at the month-end, and "Independence" and "Thanksgiving" Days each moved a day to gain week-end extra-holiday advantages:—*

	Year 1916 Dates.		Proposed Style's Suggested Dates.	
St. David's Day	March	1	March	4
St. Patrick's Day	March	17	March	20
Lady Day	March	25	March	28
Good Friday	April	21	April	27
{Easter Sunday	April	23	May	1 }
{St. George's Day	April	23	May	1 }
{Leap Day (Holiday) ...	Feb.	29	June	28 }
{Whit-Sunday	June	11	*Sol.*	*1* }
Independence Day (U.S.A.)	*July*	*4*	*Sol.*	*16*
August Bank Holiday ...	Aug.	7	Aug.	2
Michaelmas Day	Sept.	29	Sept.	20
Martinmas Day	Nov.	23	Nov.	19
Thanksgiving Day (U.S.A.)	*Nov.*	*24*	*Nov.*	*20*
St. Andrew's Day	Nov.	30	Nov.	26
Christmas Day	Dec.	25	Dec.	22

L Leap Day, instead of being on February 29th is proposed to be held in Mid-Summer as a duplicate Saturday Holiday on June 28 L, to combine with week-end and Whitsuntide Holidays.

It is suggested to our American friends that they could gain more from their National Holidays, if they were thus permanently combined with the week-ends for public convenience, by merely moving "Independence Day" one day forward, and "Thanksgiving Day" one day later, just as they now do temporarily when those Holidays fall on Sunday.

NOTES.

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